PAINT and VARNISH

THE TECHNICAL MAGAZINE FOR MANUFACTURERS OF PAINT, VARNISH, LACQUER AND OTHER SYNTHETIC FINISHES

This little car (it's really a brush) doesn't go anywhere – just back and forth on our scrub-tester. Charlie Burger, Head of our Technical Service Lab is the official driver.

Recently, it made an exceptionally long trip and we'd like to tell about it:

Our Technical Service Lab set out to determine what effect **ZIRCO** would have on scrubability of an alkyd flat paint.

The results were startling! Wet abrasion resistance was more than doubled when **ZIRCO** replaced the lead drier in the original formulation. The brush had to make over 115,000 trips before film failure!

What's more, the addition of **ZIRCO** reduced the angular sheen after scrubbing to such an extent that there was practically no difference in sheen between the scrubbed and unscrubbed portions of the film.

the little car that goes nowhere!

Let's face it! **ZIRCO** belongs in your paint (if it's not there already). Write for samples and complete technical data.

ADVANCE
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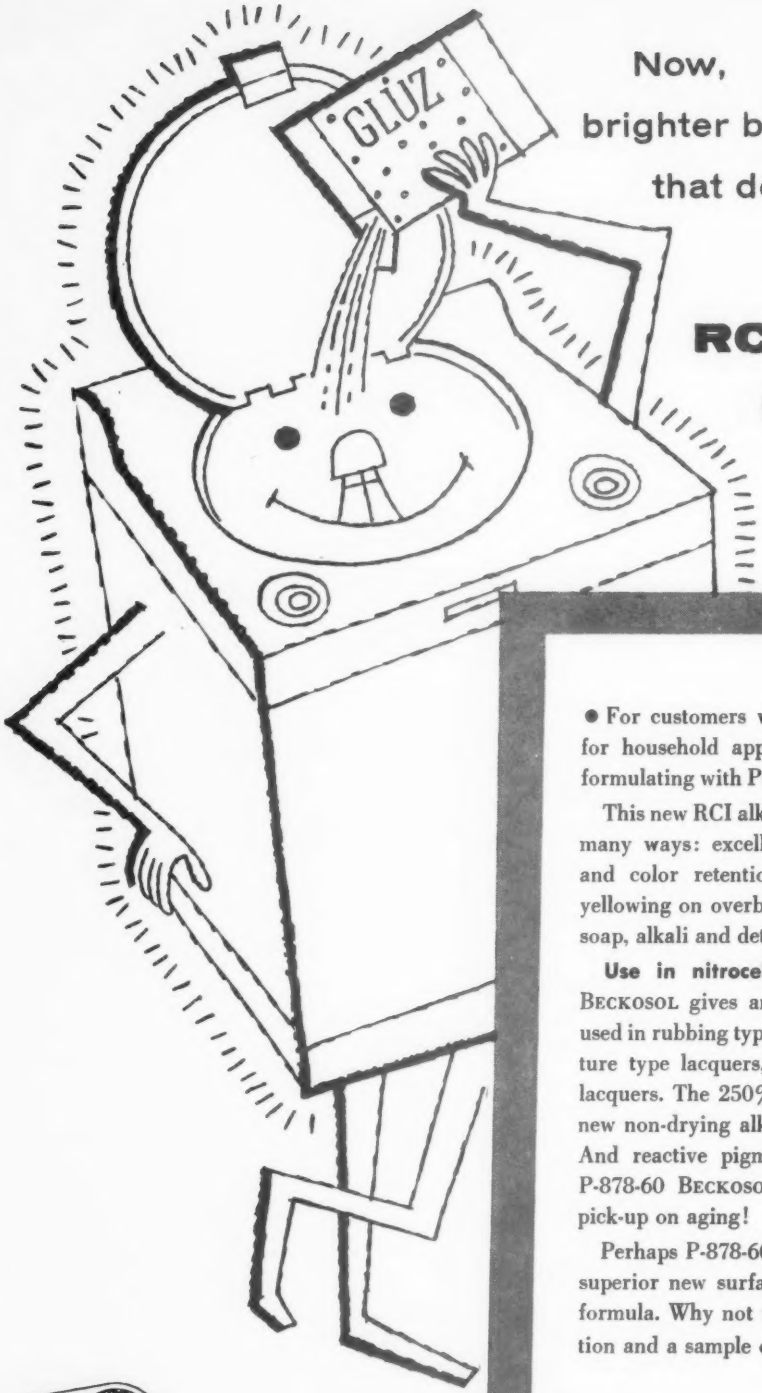

Now,
brighter baked enamels
that detergents
won't dull!

RCI develops a new non-drying alkyd resin

• For customers who need a "super" baking enamel for household appliances, we suggest that you start formulating with P-878-60 BECKOSOL and amine resins!

This new RCI alkyd provides superior performance in many ways: excellent initial color, outstanding gloss and color retention, improved ability to withstand yellowing on overbake, high resistance to the effects of soap, alkali and detergent solutions.

Use in nitrocellulose lacquers, too — P-878-60 BECKOSOL gives an exceptionally durable gloss when used in rubbing type automotive lacquers, in clear furniture type lacquers, and in rigidly controlled aircraft lacquers. The 250% aliphatic solvent tolerance of this new non-drying alkyd permits latitude in formulating. And reactive pigments can be dispersed directly in P-878-60 BECKOSOL with very little or no viscosity pick-up on aging!

Perhaps P-878-60 BECKOSOL can help you develop a superior new surface coating, or improve an existing formula. Why not write RCI for formulating information and a sample of this new non-drying alkyd?

RCI

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in Progress

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Synthetic Resins • Chemical Colors • Industrial Adhesives • Plasticizers
Phenol • Formaldehyde • Glycerine • Phthalic Anhydride
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REICHHOLD CHEMICALS, INC., RCI BUILDING, WHITE PLAINS, N.Y.

HYDROCARBON PANAREZ RESINS

For your OLEO-RESINOUS VARNISHES AND ALKYDS ...PANAREZ gives you

TOP QUALITY

and Low Cost, too

Definite improvement in chemical and mar resistance of protective finishes is one of the results from use of PANAREZ hydrocarbon resins. Others are improved gloss, improved brushing and leveling while retaining flexibility and adhesion.

PANAREZ resins are neutral, and compatible in oleo-resinous varnishes with phenolics, ester gums, hydrogenated rosins, coumarone-indene and other synthetic resins. Also compatible in most medium and long oil alkyds.

PHYSICAL PROPERTIES

	Color Gardner	Softening Point, °F	Iodine Number	Acid Number
PANAREZ 3-210	9	200-220	230	0-1
PANAREZ 6-210	11	200-220	165	0-1
PANAREZ 7-210	18+	200-220	150	0-1
PANAREZ 8-210	18+	200-220	130	0-1
PANAREZ 9-210	15	200-220	160	0-1
PANAREZ 12-210	16	200-220	60	0-1

We welcome the opportunity to work confidentially with you on your particular problem, and recommend the type of PANAREZ best suited for your needs.

Available promptly in unlimited supply—by the car load, ship load, or individual drums. Warehouses conveniently located in major industrial centers.
SAMPLES FURNISHED WITHOUT OBLIGATION.

PAN AMERICAN CORP *Chemicals*

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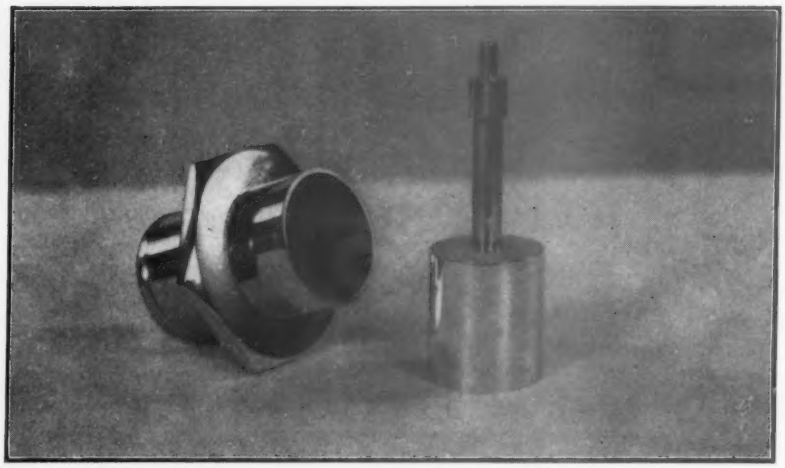
PAN AMERICAN CHEMICALS

PANAREZ Hydrocarbon resins • **PANAPOL** Hydrocarbon drying oils • **PANASOL** Aromatic solvents

DUTCH BOY GELLING AGENTS IN MODERN PAINT FORMULATIONS

BENTONE® 34 Boosts Strength and Integrity of seal, Increases "Hold-out" in Wall Primer-Sealers



To insure complete accuracy in BENTONE formulations, National Lead Laboratory uses this special close clearance (0.143″) cup and bob in a modified Stormer Viscometer.

In wall primer-sealer systems, about 900 long hydrocarbon chains form on each surface of each two-sided colloidal BENTONE 34 flake. Interlocked in a strong gel, they establish a tough, durable seal that keeps its integrity when dry. What's more, BENTONE 34 aids "hold-out" by controlling penetration of the vehicle into porous surfaces. Brushability and viscosity are improved, too.

"No-wait" Stipple Paints

Today, stipple effects can be produced as soon as the paint is applied to the sealed surface. With BENTONE 34, no waiting for partial set is needed. BENTONE 34 controls sagging or running, prevents irregularities, without harming workability.

DUTCH BOY Handbooks Provide Technical Data

You can get information on amounts of gellant to use, properties, theories, formulations in the DUTCH BOY BENTONE 18-C and 34 handbooks and a DUTCH BOY BEN-A-GEL leaflet. If you don't yet have copies, write today.

Dutch Boy® CHEMICALS

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111 Broadway, New York 6, N. Y.
In Canada: CANADIAN TITANIUM PIGMENTS LIMITED
630 Dorchester Street, West · Montreal

Solves Settling Problem in Vinyl Anti-fouling Paint Storage

"Good storage" vinyl anti-fouling paints containing very high concentrations of cuprous oxide are being made with BENTONE 18-C.

Stops "frog eyes". *Here pigment dispersions developed by* BEN-A-GEL® *and thickener "A" in a latex paint are compared. Note* BEN-A-GEL *improvement.*

A Typical Formula:

Cuprous Oxide	800 lbs.	15.7 gals.
BENTONE 18-C	15 lbs.	1.0 gals.
Vinylite Resin VYHH	80 lbs.	7.1 gals.
Resin	80 lbs.	8.9 gals.
Tricresyl Phosphate	30 lbs.	3.0 gals.
Methyl Isobutyl Ketone	275 lbs.	41.1 gals.
Xylene	180 lbs.	24.8 gals.
Total	1460 lbs.	101.6 gals.

PAINT and VARNISH Production

(REG. U.S. PATENT OFFICE)

Formerly PAINT and VARNISH PRODUCTION MANAGER
(Established in 1910 as The Paint and Varnish Record)

VOL. 45 DECEMBER, 1955 NO. 13

Paint and Varnish Prod.
Wishes You
A Merry Christmas
and
A Happy New Year

Published Monthly by
Powell Magazines, Inc.
Executive and Editorial Offices
855 Ave. of Americas
New York 1, N. Y.
BRyant 9-0499

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MEMBER BUSINESS BPA PUBLICATIONS AUDIT, INC.

PAINT and VARNISH PRODUCTION is published monthly except semi-monthly in February at Easton, Pa. by Powell Magazines, Inc. John Powell, president; Ira P. MacNair, vice-president and treasurer; Alice L. Lynch, secretary. Entered as second class matter at Post Office at Easton, Pa., Jan. 30th, 1952, under the Act of March 3, 1879. Subscription rates: United States and Possessions, $3.00 a year, $5.00 for two years, $10.00 for five years. Single copies 50c each. Canada, $4.00 a year. Pan American Countries, $4.00 a year. All other countries $8.00. Editorial and business office: 855 Avenue of the Americas, New York 1, N. Y. BR-9-0499.

with the help of **EPON® RESIN...**

New paint prevents damage by hydraulic fluid, exhaust deposits, weathering on Douglas planes

Above right

Douglas DC-7, new record-breaking luxury airliner.

Applying Epon resin-based "Cat-A-Lac" to exterior wing section of a Douglas DC-7. Cat-A-Lac is manufactured by Finch Paint and Chemical Co., Torrance, California.

FIRE-RESISTANT hydraulic fluid, widely adopted by the airlines, attacks ordinary paint. Faced with this problem, materials experts of Douglas Aircraft Company began a search for a protective coating that would stand up to synthetic hydraulic fluid, as well as wind and rain, erosion at air speeds of 300-400 mph, and corrosive exhaust deposits.

In several years of investigation, more than 300 formulations were tested. *But only "Cat-A-Lac" formulated from Epon resins*, applied in exhaust path areas, was *100% intact after more than 1000 hours in actual airline service.*

Because of the unusual durability of Epon resin-based coatings, they have been adopted by Douglas and leading airline operators for plane areas exposed to hot exhaust gases, gasoline, hydraulic fluid and cleaning solvents.

Paint users are recognizing these advantages of Epon resin-based formulations — excellent adhesion, resistance to abrasion and impact, ability to withstand extremes of heat, humidity and corrosive atmospheres. Your Shell Chemical representative will explain how Epon resins can improve your own paint and enamel formulations. Write or telephone for the brochures, "Epon Resins for Surface Coatings" and "Epon Resin Esters for Surface Coatings."

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EPON resins are the epoxy polymers made exclusively by Shell Chemical Corporation.

Inspiration at High School Level Needed

THE hope of producing more scientists and engineers in the years ahead lies in fostering interest in the physical sciences to boys and girls of high school level.

This opinion was expressed by Dr. J. C. Warner, president of the Carnegie Institute of Technology and president-elect of the American Chemical Society, at the recent Southeastern Regional Meeting of the American Chemical Society in Columbia, S. C. He explained that it is in the secondary schools, by and large, that qualified boys and girls become committed to careers in science and engineering. This means, he emphasized,—

"That we must have competent and inspiring teachers of science in the schools."

In this connection Dr. Warner offered the following three-point program for obtaining more and better high school science teachers as a key to the solution of the problem of critical shortage of scientists and engineers:

"1. Science teaching in the schools should be made more attractive by substantial increases in the salary scale. I see no reason why we should not be realistic and admit that we may have to pay more for good science teachers than for teachers in some other subject fields.

"2. Science teacher certification requirements in the various states should be revised to place more emphasis on the understanding of science and less on training in pedagogy.

"3. Effective science teachers should be awarded more public acclaim and prestige in their communities."

The obvious purpose of Dr. Warner's three-point program is to increase the number of science teachers and upgrade the calibre of science teaching in our secondary schools.

It has been estimated that fifty percent of our high schools do not regularly include science courses in their curriculla. It is difficult to ascertain exactly how many high school students have been deprived of a science education by such a situation, but there is no question that the number is indeed great.

Another factor aggravating the shortage of the nation's technical manpower is the general dislike for science and mathematics courses among both high school and college students; being more prevalent at the high school level. Undoubtedly one of the reasons for dislike of these courses is the scarcity of competent science teachers. In many schools science is being taught by teachers who have not even majored in chemistry, physics or mathematics. As might be expected, courses given by these teachers are often dull and unappetizing.

Another serious cause for the dislike of science has been the laxity in science instruction during recent years. This observation was made in a report by Dr. Robert H. Carleton, executive secretary of the National Science Teachers Association who decried the laxity of many American high school administrators and boards of education in "allowing such vital and significant experience for the countrys' future scientists to be frittered away by so-called 'demonstration methods' in place of student laboratory work."

Dr. Carleton further stated that adequate scientific equipment is sadly lacking in many of our schools and in some cases, no provision for laboratories have been made.

Such conditions point up the cause for the general decline in enrollment of science courses.

Certainly there are many ramifications to the problem of instilling science interest at the high school level, but we must take cognizance of the fact that in recent years the so called "progressive education" plan has actually hindered our high school students to pursue a vigorous program in mathematics and science—a situation which has further contributed to the serious shortage of the nation's scientists and engineers.

Why Vinyl Paint?

This asbestos shingle home located in New Jersey was first coated with vinyl paint in the spring of 1954; a second coat was applied one year later to 3 sides of the home. The first coat on the fourth side still had its original freshness—proving the non-yellowing quality of vinyl paint.

NONYELLOWING:

Vinyl emulsion paint keeps this asbestos shingle suburban home sparkling white. Why? Because it is not sensitive to the sun's rays. Further, this modern plastic coating picks up less dirt and soot than other types of paint. Winter or summer, whites stay cleaner, colors look fresher.

FAST RECOAT:

Vinyl emulsion paint dries in as little as twenty minutes. So fast that recoating is possible without shifting ladders or moving scaffolding. Too, when it's clean-up time, brushes and equipment can be washed in ordinary soap and water. No unpleasant solvents are needed. No fire hazard is present.

This vinyl paint is not ordinary vinyl paint:

- It forms tougher films.
- It resists water and scrubbing better.
- It minimizes blistering.

This vinyl paint is one of the many exterior—and interior—formulations based on RESYN 12K-51, National's inherently flexible copolymer emulsion. Details available upon request.

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Metaphenylenediamine Dodecenylsuccinic Anhydride
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give exterior masonry paints that extra margin of rugged durability and protection

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for low vehicle solids at higher viscosity

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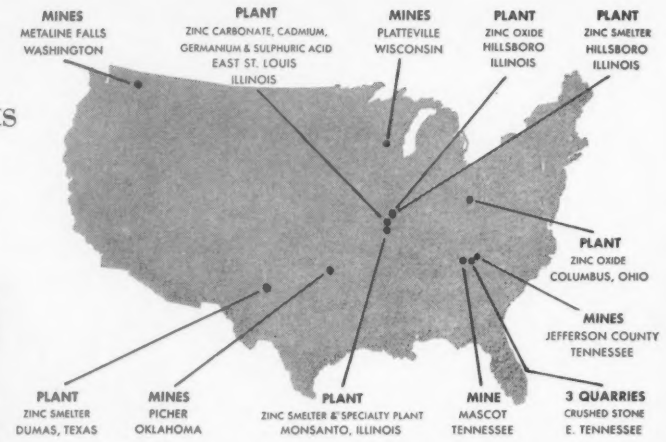

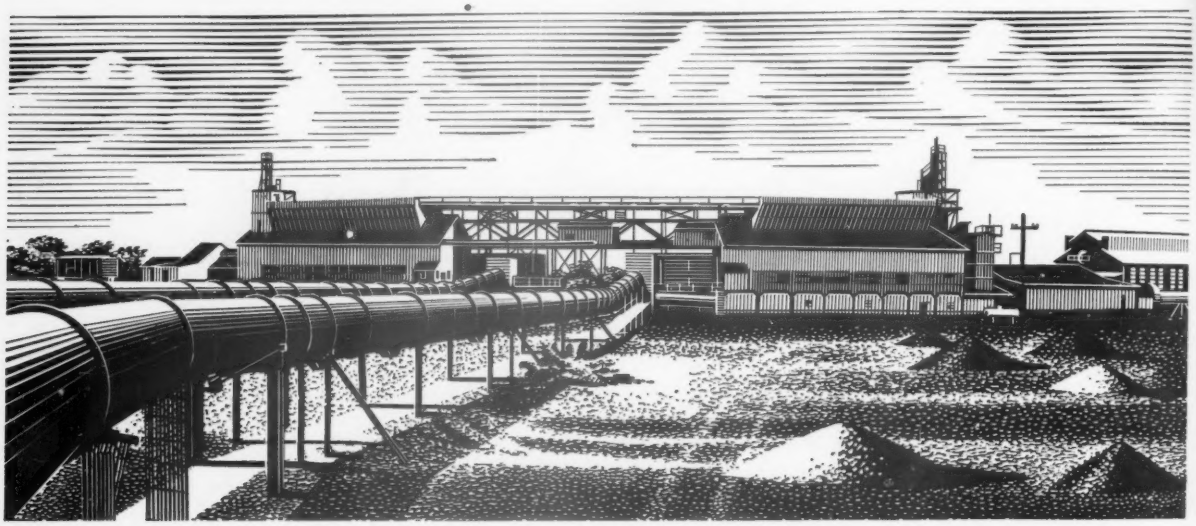

DUAL OPERATION AT HILLSBORO, ILLINOIS

(1) The Oxide Division supplies American process lead-free and leaded zinc oxide, as well as French process zinc oxide. (2) In the Metal Division, Prime Western, Select, Brass Special, Intermediate and High Grade slab zinc are produced. For complete picture of American Zinc operations, see map above.

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the trend is to COLOR in house paints.

. . . and these DUPONT PIGMENTS set the standard for bright, durable finishes

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- **"Ramapo" Blue FR BP-366-D**
- **"Ramapo" Green GP-755-D**
- **Medium Chrome Yellow Y-469-D**
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"New Trends in Colored House Paints", a report by W. G. Vannoy of the Pigments Department on Du Pont's work and experience with colored house paints has just been published. Reprints are available on request. Write to E. I. du Pont de Nemours & Co. (Inc.), Pigments Department, Wilmington 98, Delaware, or our District Sales Office nearest you.

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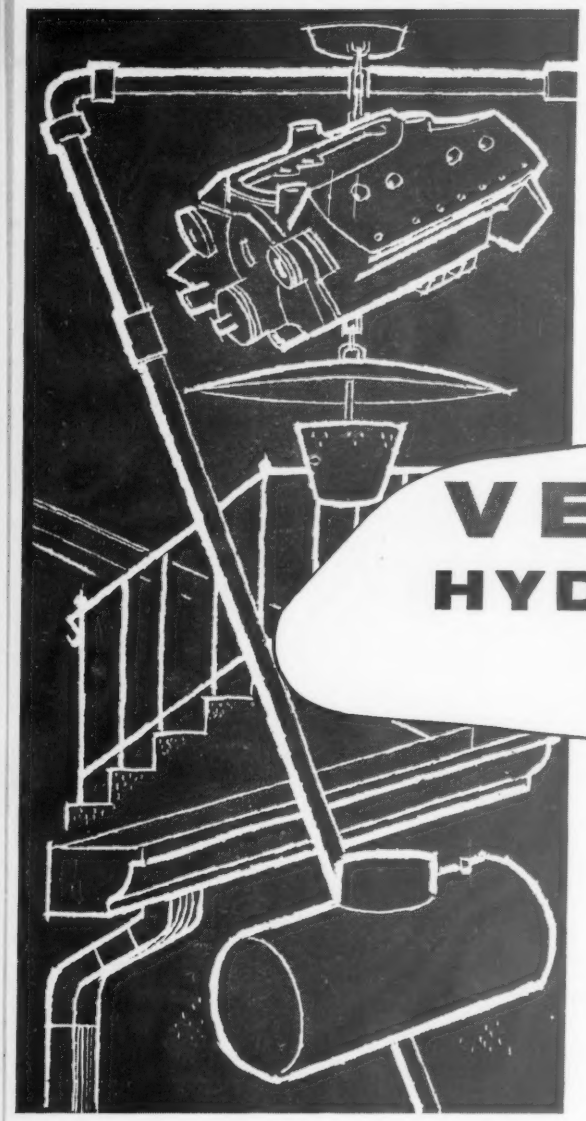

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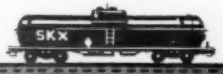
In this photograph Dick James, Linseed Oil Sales Manager, consults with Harold Wright, Traffic Manager, about an urgent shipment. In the background, the Tank Car Control Board, charting the day-to-day rail movements, shows that a suitable car is available to the mill that can make this shipment. In a few minutes the mill's local traffic representative will receive a teletype message identifying the car and directing its use for the particular shipment. The oil will be there when needed . . . for the Spencer Kellogg customer . . . good team play . . . good service!

KELLOGG'S THE TEST TELLS 1894



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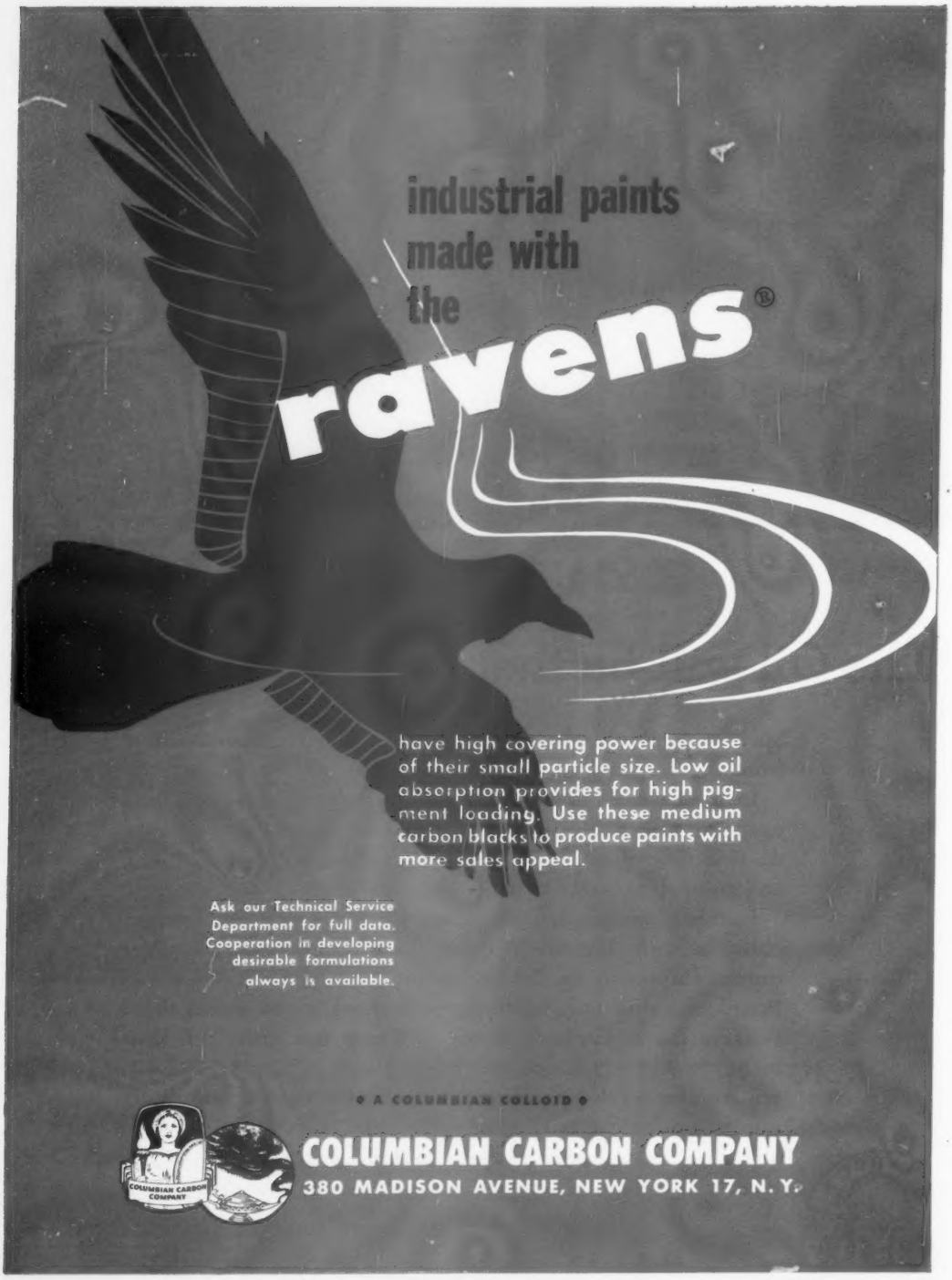
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Here's why:

- **handles at temperatures of wax in conventional equipment.**
- **gives a high gloss, enhances and adds richness to colors, improves scuff and abrasion resistance.**
- **is completely compatible with all waxes and actually fortifies all your wax formulations.**
- **permits close control of coating weight.**
- **easier to use, easier to handle. You can use higher percentages of A-C POLYETHYLENE on standard coating equipment.**

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Latex paint applied in Northern Michigan.

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Even when applied in extreme weather conditions, exterior paint made with Dow Latex 512-K dries to a tough, durable finish that resists alkali, stain and rust!

No need to alter your paint formulations to meet the requirements of varying climatic conditions when you use Dow Latex 512-K (STYRENE-BUTADIENE). Application in southern heat or northern cold won't lessen the outstanding advantages of this exterior latex paint. And it takes only one formulation!

When you use Dow Latex, your paint is ready for any market on the map. It's ready to give your customers the tough, durable finish that has *proved* superior. Paints made with Dow Latex let masonry breathe . . . they're waterproof, alkali, stain and rust resistant . . . they won't mildew, retain dirt or yellow with time. And when they fail (as *all* paints do) they chalk gradually and make repainting easy.

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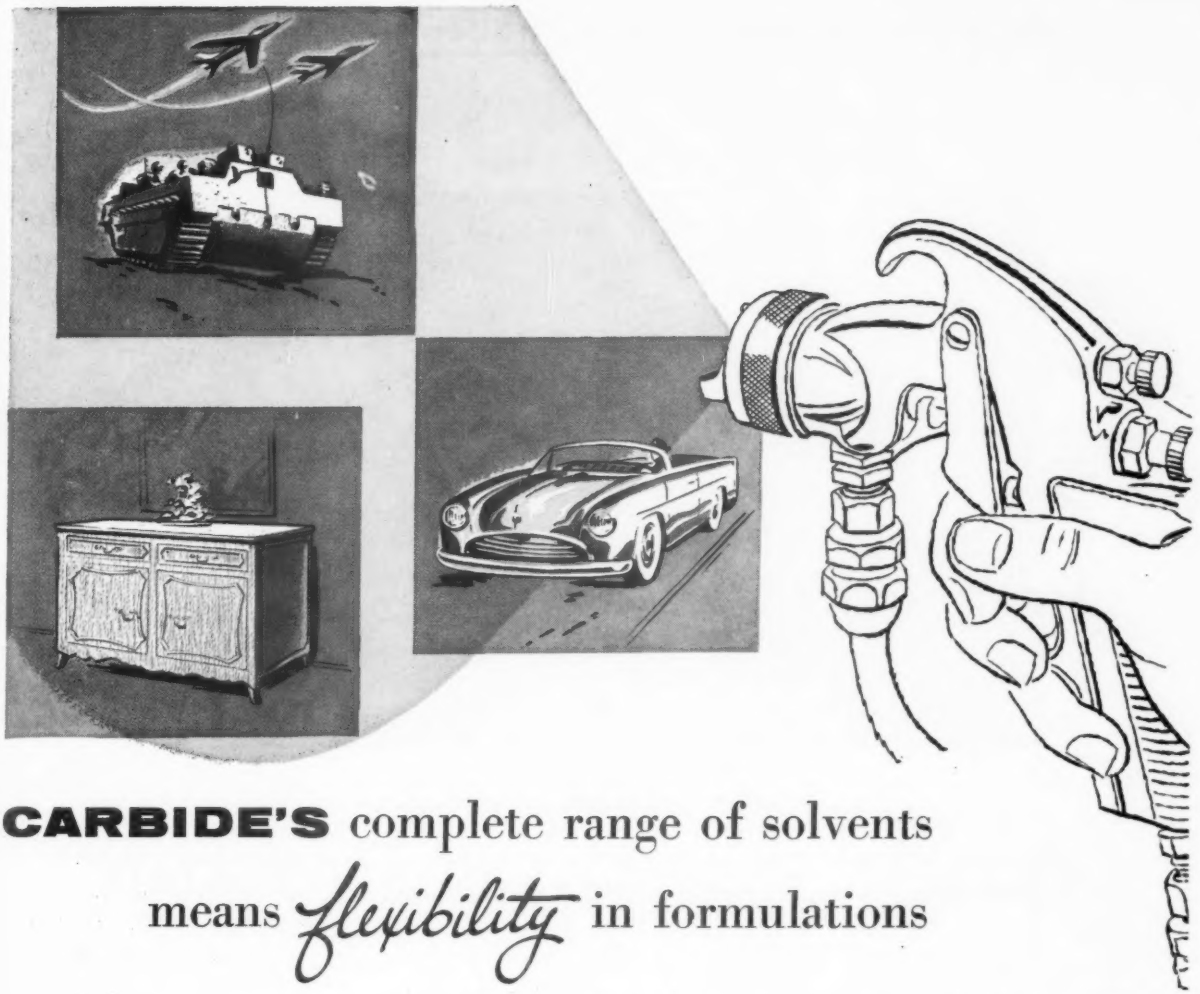

CARBIDE'S complete range of solvents means *flexibility* in formulations

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physical properties

Boiling point, °C @ 760 mm	190.5
Dilution ratio with Toluene	1.8
Evaporation rate (n-butyl acetate = 1.0)	0.02
Flash point, Cleveland Open Cup, °F	205
Pounds/gallon, 68 F	9.2
Refractive index, $n_D^{20^\circ C}$	1.4150
Solubility in water, % weight @ 20 C	16.4
Solubility water in, % weight @ 20 C	7.0
Specific gravity, 20 /20 C	1.1063
Vapor pressure @ 20 C mm Hg	0.25
Viscosity, centipoises @ 20 C	2.86
Viscosity, 10% 1/2 second nitrocellulose solution, centipoises @ 25 C	444

specifications

Specific gravity, 20°/20°C	1.103-1.109
Distillation range, C	186-195
Ester content, % minimum	97
Acidity, as Acetic, % weight, maximum	0.15
Color, APHA	15

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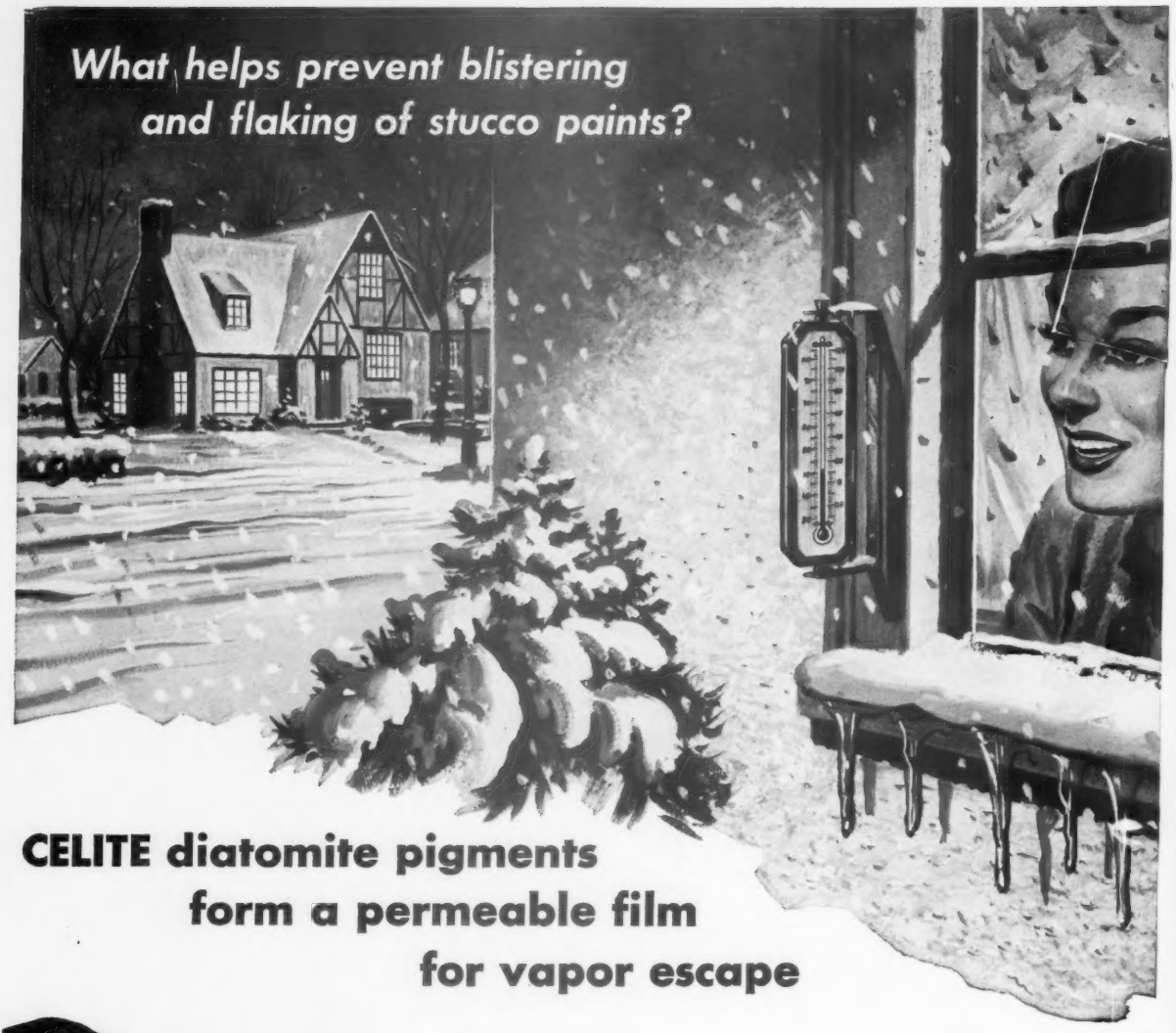
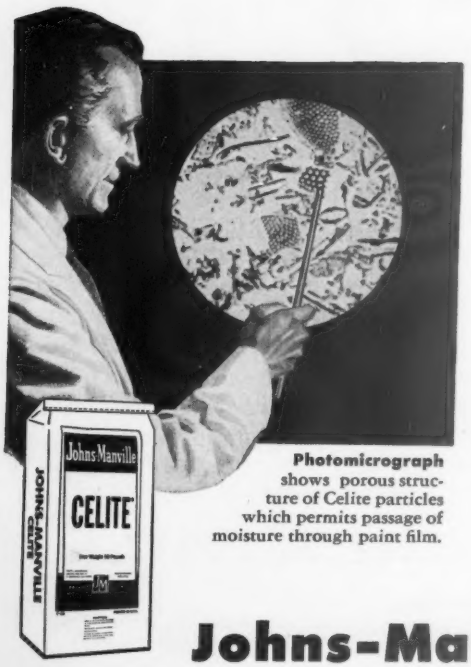


CELITE diatomite pigments form a permeable film for vapor escape



Photomicrograph shows porous structure of Celite particles which permits passage of moisture through paint film.

COLD WEATHER spells trouble for stucco paint. For the colder it gets the greater the vapor pressure due to the temperature differential. When paint resists this pressure, serious blistering and flaking result. But when Celite* is present in the formulation, the moisture passes through a vapor-permeable film formed by the microscopic particles. Yet this same film will resist the penetration of exterior moisture.

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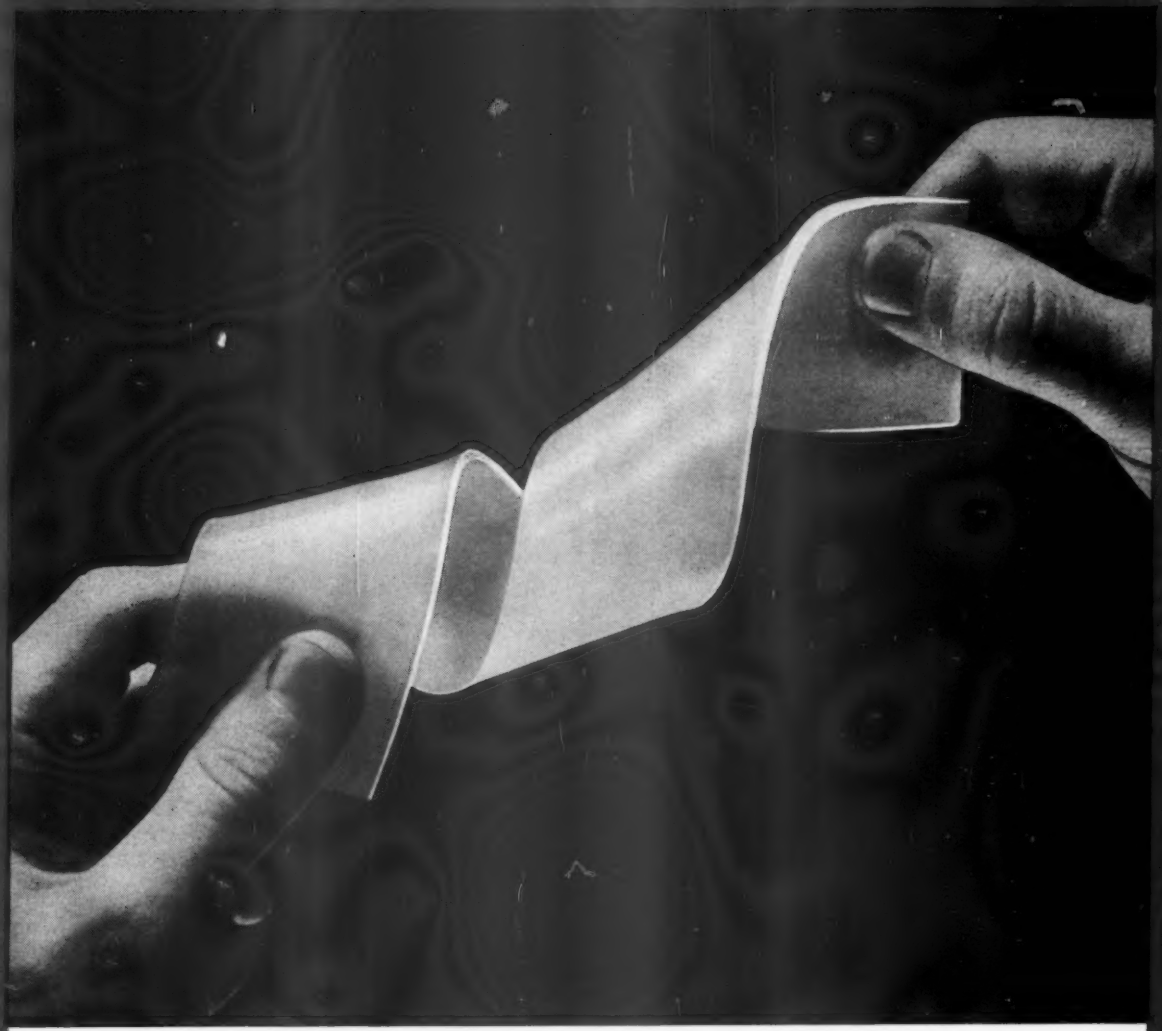

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PHYSICAL PROPERTIES

Molecular Weight	278.34
Boiling Point at 760 mm	340°C
Vapor Pressure: 198.2°C	10 mm
287.0°C	200 mm
313.5°C	400 mm
Freezing Point	−35°C
Density at 25°C	1.0426 g/ml
Weight per U.S. Gallon at 68°F	8.72 lb
Coefficient of Expansion, °F	0.00048
°C	0.00086
Refractive Index, n_D at 25°C	1.4914
Viscosity at 25°C	15.8 cp
Heat of Vaporization at bp	18.93 kcal/mole
Specific Heat at ordinary temperatures	0.43 cal/g (approx.)
Electrical Conductivity at 30°C	4.2×10^{-8} mho/cm
Dielectric Constant at 30°C	6.436
Flash Point, Cleveland Open Cup	340°F
Solubility in Water at 20°C, by weight	0.01%
Solubility of Water in Dibutyl Phthalate at 20°C, by weight	0.46%

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CSC INDUSTRIAL CHEMICALS

A Staff Report

ISOCYANATE RESINS FOR COATINGS

PART II

(Conclusion)

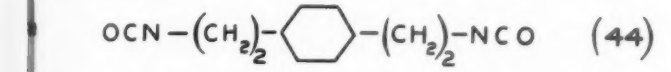
The Polyurethanes

Development of the Polyurethanes:

The development of the polyurethanes by I. G. Farbenindustrie in Germany was first undertaken in 1937. (41, 80, 81, 82) Considerable advances were made during the war at the Leverkusen plant and investigations were also begun elsewhere. (41,83,84,85,325,327) Recently, Russian work has been published on fundamental studies of the glycol-diisocyanate reaction. (267,282)

However, the names of Dr. Otto Baeyer and his co-workers at Leverkusen are the most prominent in this field and the number of papers on polyisocyanates and polyurethanes from this group is quite large. (139,167,168,184,296)

A wide range of polyurethanes made from different polyfunctional reactants was investigated by Baeyer and his associates. The products had melting points varying from 183°C to 255°C and densities from 1.15 to 1.40. The purely aliphatic reactants gave the most satisfactory materials. Greater transparencies appeared to be exhibited by polyurethanes with odd numbers of $-CH_2-$ groups between urethane linkages. Aromatic diisocyanates gave polyurethanes of (seemingly) little value. They could not be stretched, had higher melting points, and were thermally unstable. Aromatic diisocyanates lead to polymers having an undue tendency to crystallize unless they have a minimum chain length of:



(44)

Mixed aromatic-aliphatic polyurethanes were found suitable as substitute leathers. Copolymers or condensation products of mixed glycols and mixed diisocyanates were also examined. They were found to be more soluble and more fusible than uniform linear polyurethanes, as may be expected. (3) Polyurethanes from long chain diisocyanates and glycols generally had low melting points, too. Diisocyanates which have been condensed with polyethylene glycols have melting points which are too low for the production of fibers; moreover, they are too water soluble. (44) The introduction of alkyl groups into the isocyanates and glycols gave condensates which could not be stretched, and which had lower melting points. Halogen substituted diisocyanates are difficult to prepare and obtain in a pure state. However, thel-chlorophenylene, 2,4-diisocyanate is the most reactive isocyanate known. (3)

PART I APPEARED IN NOVEMBER 1955 ISSUE

Manufacture of the Polyurethanes: (174)

A linear polymer known as Igamid U (Molecular weight of 10,000, K-value = 60-70) or Perlon U (K-value = 55-60) was made by condensing 1,4-butylene glycol with 1,6-hexamethylenediisocyanate. This was first done by solvent polymerization, and, at a later time, by mass polymerization. (3,4,83)

In the solvent reaction, 1.004 mols of 1,6-hexamethylene diisocyanate was added to 1.000 mol of butylene glycol in a solvent blend of 90 parts of monochlorobenzene and 10 parts of ortho-dichlorobenzene. Condensation will take place at room temperature, but it was customary to use heat and a solvent.

The glycol was added to the solvent mix in a stainless steel reactor, and after warming to 60-70°C, the diisocyanate was added. The temperature rose to the reflux point and the reaction had to be controlled by cooling. (The reaction is very exothermic—52 Cal/mol of polyurethane). Condensation was complete in 5-6 hours, the polyurethane separating out as a fine, sandy powder in practically quantitative yield. The product was filtered, washed with monochlorobenzene and steam distilled to remove solvent, The polyurethane was then dried at 65°C and 30 mm Hg vacuum.

Depending on the temperature of the reaction and the period in which the product remains dissolved, which can be adjusted by the addition of dichlorobenzene or by controlling the chain length with monofunctional compounds, polyurethanes of varying degrees of polymerization can be synthesized.

The mass type manufacture of Igamid U by the direct action of the diisocyanate on molten butylene glycol was undertaken by I. G. Farbenindustrie in 1944 for the sake of economy. (44). Also, the solvent process had the disadvantage of producing the polyurethane in the form of a fine powder having a high surface activity. This would lead to rapid oxygen adsorption, with consequent degradation at elevated temperatures. The two products had substantially the same molecular weight distribution. During the reaction it was essential to avoid an excess of hexamethylene diisocyanate as this tended to give cross-linked polymers; at the start 50-60% of the theoretical quantity of the diisocyanate was added and the rest added over a period of one half hour with very rapid stirring to give a final excess of 0.5% of the butylene glycol. The starting temperature was 120°C which was gradually raised to the melting point of the polyurethane during the course of the

reaction. The product was controlled by the determination of the degree of extension of the fibers and also by the K-value.*

The molecular weight distribution of Igamid U is very sharp and an equilibrium dependent on temperature is obtained; the polyurethanes tend to depolymerize at 200°C. The exact relationship between K value and molecular weight is not known. Other analytical methods for distribution studies make use of newer techniques, such as paper chromatography. (212)

In these reactions, it was very important for the diisocyanates to be 99.5—100% pure (preferably distilled immediately before use) and that the butylene glycol have a sharp melting point of 19.8°C and a water content of less that 0.05%.

Polyurethanes could be made by other means, e.g. by condensing diamines with glycol chlorocarbonic esters (Hochst method), with biscarbamic esters of diamines, and with diphenyl carbonate, and by polymerizing amino chlorocarbamic esters. (44,43,86,244,298,299) In Japan, polyurethanes have been prepared from esters of omega-hydroxy acids and omega-hydroxy alkyl isocyanates (218) and from hydroxyazides in a solvent process. (247) The manufacture of polyurethanes by the continuous reaction of bischloroformates and diaminies has been reported. (306)

However, none of these methods were able to compete with the original method both in quality and economy of product.

Applications of the Isocyanates: 169,197,334,347,354)

Plastics: (144,336,337,356,357)

The Igamid U product was used for plastics and the Perlon U was designed for synthetic fibers and bristles.

Igamid U has a melting point of 183°C; the closeness of its softening point and melting point indicates a more uniform product than the polyamides obtained by condensation. A comparison of the properties of Igamid U with a polyamide is shown in Table I.

Properties of the Igamids

Property	Igamid U (Polyurethane)	Igamid B (Polyamide)
Specific Gravity	1.21	1.15
Melting Point, °C, approx.	183	210
Brinell Hardness, kg/sq.cm.	750	600
Flow Temperature, °C	170-180	160-180
Impact strength, kg cm/sq.cm.	about 100	over 100
Unoriented Material		
Tensile Strength, kg/sq.cm.	620	380
Resistance to cold, °C	+ 8	+ 13
Oriented Material		
Tensile strength, kg/sq.cm.		
Machine direction	874	1050
Cross direction	400	860
Elongation, %		
Machine direction	60	73
Cross direction	81	70
Resistance to cold, °C	− 30	− 30

Table I

One specific characteristic of Igamid U and all the other polyurethanes is their low water absorption (0.5% after 10 days immersion). This decreases further with an increase in CH_2 groups in the chain, but tensile strength and melting points also decrease because the molecule becomes more paraffin-like. The polyurethanes also surpass the polyamides in electrical properties, weather resistance, reagent, acid and solvent resistance, hardness and moldability. They have been used for molding condensers for high frequency electrical equipment and for insulated electrical conductors (248) One of the most outstanding features of the use of polyurethanes in electrical wire coating is the ease of soldering wires directly, without stripping the coating, by dipping the wire ends in molten tin. (265)

These special properties, together with the other beneficial properties characteristic of the superpolyamides, indicate that Igamid U is a valuable high melting thermoplastic for the plastics industry. It can be processed by ordinary plastic operations with the addition of stabilizers, such as 4,4′-dihydroxydiphenyl or betanaphthol, to prevent further condensation and heat decomposition, and softeners or plasticizers, such as N-methyl benzene sulfonamide. (44) Plasticizers for polyurethanes have been shown to have maximum efficiency when containing OH,SH or NH_2 groups. (166) The corrosion resistance of such plastics has been studied. (300)

Injection moldings produced from Igamid U are dimensionally stable and resistant to water and water vapor. These properties have suggested various industrial applications, e.g. highly resistant filter cloth, protective clothing resistant to acids and to mustard gas, driving belts, ropes and cable insulation. However, due to their low water absorption, the polyurethanes are not particularly suitable for such textiles as underwear and ladies hoisery.

A few other types of polyurethanes besides Igamid U offer promise of industrial importance. The simple, homogeneous polymers, like Igamid U, are practically insoluble in all solvents at low temperatures. However, the mixed polymers, produced from a mixture of diisocyanate or glycol components, are readily soluble in chlorinated hydrocarbons, even at low temperatures. They have lower melting points, a larger thermoplastic range, greater softness and better compatibility with plasticizers. They are therefore good materials for films, foils and leather substitutes. (3,87,148, 239) More recently, artificial leathers and paper coatings have been made from polyurethanes plasticized with N-substituted aromatic sulfonamides. (219)

Some miscellaneous plastics applications include the following:

Laminates based on aldehyde rubbers and isocyanates (134) and on hydroxyethyl acrylate and isocyanates (182) have been reported. Plastic laminates based on vinyl or cellulosic resins laminated to a toluene 2,4-diisocyanate reacted polyester on fabrics have shown superior abrasion resistance and adhesion. (317)

Isocyanate derivatives of proteins have yielded plastic materials. (160) Shaped plastic articles have been prepared based on isocyanate modified polyvinyl chloride resins. (229,276). Polyesters with unique properties (particularly flame resistance) can be made from halogenated polyisocyanates. (271)

Polystyrene has been treated with phenyl isocyanate under Friedel-Crafts catalytic conditions. These carbamylated polystyrenes have shown superior heat distortion resistance and solvent resistance. (275) A plastic coating can be applied to a methyl methacrylate surface by treatment with tetramethylene diisocyanate, followed by exposure to moist air for 12 hours at room temperature. (315)

Fibers and Bristles: (129,186,199,210,217,246,297,301,302, 303,312)

Perlon U. with its hardness, wirelike elasticity, and insensitivity to moisture up to 80°C, was a valuable material for bristles and filaments. It was similar to Nylon in many respects and somewhat superior in water, reagent, solvent resistance, wet hardness, dimensional stability, electrical properties, and insensitivity to oxygen; however, it was inferior in heat resistance. In laboratory tests, the maximum

*K-value: The Fikentscher K value is an empirical figure determined by measuring the viscosity of a 1% solution of the polyurethane in meta- cresol. The viscosity coefficient, K, is calculated as follows: (83)

$$\frac{\log \eta_{rel.}}{c} = \frac{75\ K^2}{1 + 1.5\ Kc} + K$$

where: $\eta_{rel.}$ = the ratio of the viscosity of the solution to that of the pure solvent
c = concentration of the solution in grams per cc.

tensile strength of Perlon U was 7.5 g/denier compared with 3.5 g/denier for silk. (211)

In making the fibers, the material was spun from a hot melt and cold drawn 400%. (245) (In connection with this cold flow, the high polymer thixotropy of polyurethanes was recently measured. (198) The stretched material exhibited a very sharp crystalline *X*-ray pattern. Considerable fundamental structural, crystal, *X*-ray diffraction and infrared studies have been made of these polyurethanes. (164,165, 188,196,200,207,214,220,254,255,256,308,311,316) The crystals are sherulitic in shape and melt from 173-184°C. After annealing, the melting point is brought to 190°C. In addition, measurement of the bond dissociation energies of these polymers has been made. (233)

Since Perlon U contained no basic groups, it could only be dyed with acetate-rayon or suspension dyestuffs. Recently, azodyes have been developed specifically for polyurethanes. (88,131,190,191,192,193,215,216,309,310,319) More recently, newer polyurethanes have been prepared with built-in dyeing characteristics (209) and luminescent properties. (189) One such fiber, designed for acid dyeing, is based on the reaction of allyl isocyanate with acrylonitrile-ethylene imine polymers. (318)

Among the commercially important, spinnable, linear superpolymers, Perlon U, has the lowest melting point, practically as low as that of acetate rayon. This low melting point makes it unfit for a number of textile purposes. However, by the use of selected coupling agents, the softening point of the fiber can be raised as much as 60°C. (43) The fiber also lends itself to acid fulling. (128)

Superpolyamides, modified with isocyanates, have shown increased stability. (117) These, and corresponding polyureas, could also be prepared from polyisocyanates and amino acids or amino alcohols. (153) They also could be prepared from diurethanes and diamines. (146,243,293,344)

Fibers of superior strength and chemical resistance have been prepared from hexamethylene diisocyanate and polyvinyl alcohol. (242) Also, fibers with unique properties have been made from cellulose acetate reacted with N-alkoxymethyl polyurethanes. (251)

Adhesives:

Another important outlet for the polyurethanes was in the adhesives field. Suitable types were made from polyfunctional reactants to allow crosslinking to occur. More commonly, the diisocyanates were combined with polyhydroxy compounds, such as polyesters and alkyds. (6,39,161,175)

In Germany, these adhesives were called "Polystals" and were used extensively in the aircraft industry for wood and metal-to-metal joints. (133) The polyisocyanates (Desmodurs) and polyhydroxy compounds (Desmophens) used at Leverkusen are listed in Tables II and III.

The Desmophens were made by esterification at 200°C under CO_2 to an acid value of 2.

The most important Polystal was made by adding 100 parts of Desmodur TH to 40 parts of Desmophen 900. Depending on the room temperature, the mixture had a pot life of 1-10 hours. Urea can be employed as an accelerator of the curing reaction. Without urea, the adhesive requires 10 hours to cure to an insoluble, infusible seal at room temperature; with urea, the cure is accomplished in 1-2 hours. The accelerator is spread on one side of the wood veneer as a 20% solution in water and dried. Moisture must be excluded from the joint during the cure. It is hazardous to use a temperature higher than 60°C in curing because of the toxicity of the volatile products; most curing is done at room temperature. This process gives a more elastic joint than phenolic adhesives; in addition, the alkali and reagent resistance is improved. (228)

One of the most remarkable uses of the isocyanates has been that of bonding dissimilar polymers together, and of bonding Buna rubber to metals, glass, plastics and porcelain, and of bonding metals to metal. (225,235,260,287,307,314,326)

Polyisocyanates

Desmodur	Chemical Composition
A	alpha-isocyanyl-ethyl benzene-3-isocyanate
C	1-chlorophenylene-2, 4-diisocyanate
DR	diphenyl-4,6,4'-triisocyanate
H	1,6-hexanediisocyanate (hexamethylene diisocyanate)
HH	Desmodur H (3 mols) and hexanetriol (1 mol)
M	dicyclohexylmethane-4,4'-diisocyanate
R	triphenylmethane-p-triisocyanate
T	2,4- (60%) and 2,6- (40%) - tolylene diisocyanate
TH	Desmodur T (3 mols) and hexanetriol (1 mol)
X	di-p-xylylmethane-4,4'-diisocyanate
—	dianisidine diisocyanate

Table II

Polyhydroxy Compounds

	Chemical Composition - Mols				
Desmophen	Adipic acid	Phthalic acid	Oxalic acid	Hexanetriol or TMP*	Butanediol
50	-	-	3.0	4.2	-
58	2.5	0.5	-	4.1	-
200	1.5	1.5	-	4.2	-
800	2.5	0.5	-	4.2	-
900	3.0	-	-	4.2	-
1100	3.0	-	-	2.1	2.1
1200	3.0	-	-	1.2	3.1

* Trimethylol propane

Table III

Tests show adhesion values up to 89 kg/sq. cm.; in which the rubber failed first, not the joints.

The addition of 2% of diisocyanate (either Desmodur T or H, or R) to Buna rubber promoted excellent adhesion to tire cords. (3,4,83,102,103,104,124,143,177) In fact, one of the first published uses of diisocyanates in the United States during the war seems to have been the treatment of tire cord fabrics to improve adhesion, using diphenylmethane-4,4'-diisocyanate.

Adhesives were also made from tin-treated rubber and diisocyanates (137), from polychloroprene and diisocyanates (141), and from epichlorhydrin-bisphenol resins and diisocyanates. (222)

The general properties of diisocyanates as bonding agents are so phenomenal that great progress is predicted for their use in the future. All of these properties were made use of in their application to the coatings field (below).

Coatings: (176,304,322,333)

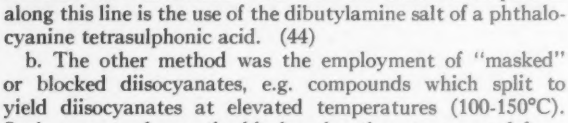
Coatings and "lacquers" were made in a manner similar to adhesives, such as dissolving sufficient polyalcohol and polyisocyanate to give an approximate ratio of 4:3 (hydroxyl to isocyanate) in a solvent containing no hydroxyl groups, adding pigments if desired. Subsequently, the "lacquer" solution is sprayed on the work and cured by standing at room temperature or by heating at temperatures up to 160°C. The reaction takes place on the surface that is coated to form a completely insoluble and infusible lacquer coating. The flexibility and hardness can be adjusted by the addition of a larger percentage of either aliphatic or aromatic components. (89,90,91,92) The coatings are glossy and water resistant, and have excellent weather resistance, electrical properties, and low permeability to gases. Since they could be formed at low temperatures, they were suitable for coating delicate surfaces, such as paper and textiles (42) and had application in the dairy industry. (158)

German Army anti-gas capes were made with paper impregnated with these lacquers; they were more resistant to mustard gas than were rubber profings. The lacquers were also extensively used in furniture finishes. (320)

The problem of pot life in these coatings (and in adhesives) can be handled in two ways:

a. Certain stabilizers or inhibitors can be used with moderate success. These include azo-dyes soluble in organic solvents and certain acid resisting compounds, such as thiourea and its derivatives. One of the latest developments along this line is the use of the dibutylamine salt of a phthalocyanine tetrasulphonic acid. (44)

b. The other method was the employment of "masked" or blocked diisocyanates, e.g. compounds which split to yield diisocyanates at elevated temperatures (100-150°C). Such compounds are the bisphenylurethanes, prepared from a diisocyanate and phenol or from phenyl chloroformate and a diamine. (350) (reaction R38)



Others are the adducts of diisocyanates and malonic ester or acetoacetic ester, which also split when heated. (reaction R_{39})

$(ROOC)_2CH\text{-}CO\text{-}NH(CH_2)_6NH\text{-}CO\text{-}CH(COOR)_2 \longrightarrow$
$(ROOC)_2CH_2 + OCN(CH_2)_6NCO + CH_2(COOR)_2$ (R_{39})

Other easily split, suitable adducts can be prepared by reacting diisocyanates with phenylmethyl pyrazolone, diphenylamine or 2-methyl-butyne-3-ol-2 and ammonia. (3)

These bound, pseudo-isocyanates have the great advantage that, as lacquer compositions, their pot life is unlimited. Even solvents containing hydroxyl groups can be used, since these mostly evaporate before the regeneration of the diisocyanate takes place. But they require a higher curing temperature and the finished products may contain undesireable decomposition products. However, experiments have shown that the phenol or malonic ester and their decomposition products evaporate during the baking process and cause no trouble. It is easier to control crosslinking to a definite degree with these agents than with free diisocyanates; this is important since the completely crosslinked polyurethanes do not always exhibit optimum properties. Recent data has been published on varnishes made with this type of blocked diisocyanate. Included are tables which show the excellent stability, abrasion resistance, hardness and gloss attainable. (313)

The malonic ester derivatives, having the lowest decomposition temperature (120°C), were the best and were used extensively in Germany as tin can coatings. They were flexible and showed better acid resistance than conventional materials; they were, however, not acetic acid proof. (44)

In addition to the Desmophens, the following polyhydroxy compounds were well suited for reaction with diisocyanates to form coatings:

a. A saponified copolymer of 80% vinyl chloride and 20% vinyl acetate.
b. The Luphenes. (alkyd-modified phenolic resins)
c. Benzyl cellulose
d. Condensation products of glycol esters conforming to the Desmophens, and oxygen-rich xylene-formaldehyde resins.

Other polyurethanes, based on the reaction of polyisocyanates with long chain glycols in dioxane solution have found application for coating wire and wood. (213)

A recent evaluation of isocyanates in coatings revealed that, in weathering tests,

a. Urethane oils (see section 11) were less durable in 1 year than 3 linseed oil alkyds;
b. the Desmodur-Desmophen system had superior durability compared to conventional spar and boat varnishes;
c. Oiticica oil showed improved properties in varnishes when treated with isocyanate, which apparently reacted with the enolized keto group of the oil; however, the durability of this treated varnish was still inferior to pure chinawood oil varnishes. (257)

The Desmodur-Desmophen system in rust-preventative coatings—red iron oxide pigmented—has shown excellent performance and durability under conditions of high atmospheric humidity. (321)

Other recent developments in coatings applications include:

Novel silicone-based thermosetting polymers have been made from hydrolyzed silanols and toluene 2,4-diisocyanate. (205)

Lacquer compositions have been formulated based on curing diisocyanate-modified polyesters or polyester-amides together with cellulosics and formaldehyde in an acid catalyzed system. (118)

Films of extraordinary toughness have been reported from alkyl carbamate polymers. These arise from the interpolymerization of an isocyanate modification of a hydrolyzed ethylene vinyl ester. (156)

A stabilized rosin isocyanate has been used to treat cellulose to form a lacquer raw material, soluble in standard lacquer solvents and compatible with raw linseed oil and estergum. (181)

Polyurethanes treated with formaldehyde in the presence of methyl alcohol have been used to prepare coatings of improved elasticity. (187)

New coating resins have been reported from the reaction of phenols, fatty acids and polyisocyanates. (204) Films of these materials have excellent flexibility and alkali resistance. (223,263)

The recent preparation of allyl-oxyphenyl isocyanate and its polymers and copolymers with ethyl acrylate and with polyesters has led to the use of these materials in unique coatings, adhesives and textiles. (268)

Solventless varnishes for electrical equipment and for polyester end uses, such as potting and casting, have been made from castor oil with diisocyanates, styrene, benzoyl peroxide, followed by additional diisocyanate. (280)

Diisocyanate-modified epichlorhydrin-bisphenol vehicles have been reported with interesting paint and varnish applications. (328)

The Desmodur-Desmophen system, together with isocyanate modified linseed oils (Urethane oils) have found application as binders in the linoleum industry. (202,305)

Molding Powders:

Molding powders were made from diisocyanates mixed with polyhydroxy compounds and a large proportion of fillers. Owing to the delicacy of control necessary, slow reacting diisocyanates, like p,p'-dixylylidene-methane diisocyanate. The reaction was carried out on hot rolls, as in the "Bakelite" technique; molding required 5-10 minutes at 140-160°C. The products exhibited good flow characteristics, electrical resistance and elasticity, as measured by the impact-bending strength. These compositions could also be cold-formed and subsequently cured in ovens. (41, 258,261)

These cross-linked polyurethanes were used for structural airplane parts and for some special applications where phenolics or ureas are not strong enough or too brittle. For example, their excellent bonding properties for abrasive particles, in addition to the aforementioned properties, make these materials well suited for high-grade abrasive wheels. (3) They were also used for products such as printing forms and phonograph records. (93,94)

Aldehyde rubber and 5-30% of a diisocyanate were used for molding sheeting, tubing and rubber-like articles. (122)

Mono- or polyisocyanates were used to purify shaped nitrogenous articles and oriented objects. (126,130)

Other molding compounds were prepared from diisocyanate- modified polyesters or polyester-amides plus poly-

vinyl acetal, followed by formaldehyde curing. (152,279, 281)

Synthetic Rubbers:

One of the most successful applications of diisocyanates in Germany involved the production of synthetic rubbers (I-Gummi, IN-Gummi). They were made with adipic acid, ethylene glycol and tetramethylene diamine crosslinked by a mixed diisocyanate at 110°C for 3 hours, in the presence of a plasticizer—dibutyl phthalate. (Plasticizers such as N-substituted sulfonamides have also been used. (253) The product has a tensile strength of 292 kg/sq. cm., an elongation of 850%, and an especially high notch stability. It had outstanding tear resistance, but poor low temperature characteristics.

Many patents have been issued concerning diisocyanate-modified polyester and polyester-amide elastomers. (119, 120, 121, 123, 135, 136, 138, 151, 172, 264, 323, 329, 343, 352, 355, 358, 359)

The most modern polyester-polyurethane rubbers, the Vulcollans and Chemigum-SL, have found increased application in Germany. and the U. S. (173, 221, 259, 295, 324, 335, 340, 360)

In addition, diisocyanates have been used for vulcanizing various elastomers (283), including those based on drying oil-adipic or sebacic acid and ethylene or decamethylene glycol polyesters (155, 353), liquid polysulfide rubbers (203) and polyesters from methallyl alcohol and diallyl itaconate. (140)

Plastic Foams: (224, 226, 266, 270, 278. 348, 349, 360)

Compositions containing polyhydroxy compounds with free carboxyl groups and diisocyanates became of interest during the war as an expanded material. They were called the "Moltoprens". The carboxylic acid reacted with the isocyanate to generate CO_2, foaming the composition, which was polymerizing. The mixture could be poured and proceeded to foam, cure and adhere spontaneously. The reaction was complete in one hour at 100-140°C.

Foam structure was intimately tied up with acid value. Low acid values (below 5) yielded no foam, whereas high acid values, in the 35-50 range, would yield good foams, when reacted with water. (346)

The cured, foamed material had a specific gravity of 0.225, but by the addition of water (up to 2%) during the reaction, the specific gravity could be reduced to 0.045. The addition of acetone, methylene chloride or paraformaldehyde as a foaming agent led to still reduced densities (about 0.02). (338) To improve strength, aluminum powder, kieselguhr or carbon black was added. The use of oxalic acid-modified polyesters was claimed to form stronger, more heat-resistant foams. (351)

The Moltoprens were used extensively in the German aircraft industry in the construction of airplane wings and stabilizers. They were also employed on submarines for sound insulation and in tanks for heat insulation. (3, 4, 83, 250)

In a similar connection, polyvinyl chloride sponges have been made from polyvinyl chloride and phenylene diisocyanate plus diazoaminobenzene. (230)

Treatment of Polymers:

Isocyanates were used to augment the molecular weight of polyesters, polyamides or mixed polymers. They were used to bond different polymers to one another, and they conferred water repellancy by reaction with hydrophillic groups. This was accomplished by the reaction of the active hydrogen atom of the unreacted functional group.

A novel use of the cross-linking diisocyanates consisted in fastening the plasticizer to the polymer molecule. Tartrate plasticizers can be rendered nonvolatile and non-extractable by this means without impairing plasticization. (42)

Alkyd resins and varnishes are vastly improved by reaction with diisocyanates. The modified resins hardened much sooner on baking and gave a more durable finish. (49, 95, 96, 289) The reaction is catalyzed by cobalt naphthenate and allied siccative compounds. Alkyds have been similarly modified with unsaturated isocyanates. (183)

Bis(p-isocyanatophenyl) methane has been reacted with ethylene or propylene oxide polymers and then condensed with butanediol, methyl pentanediol, pentaerythritol, sucrose, monoglycerides, etc. This is a slow reaction, which may be catalyzed with methyl-morpholine. The products are useful for adhesives, films and foams. (341)

Other polymers whose properties are improved by isocyanate treatment are: polyvinyl resins, polyacrylates, polystyrene, polyethers, phenol-, aniline-, and urea-formaldehyde resins. (97-101, 154, 185, 294, 339)

Treatment of Textiles:

Isocyanates have been used for the treatment of cellulose-based textiles and fabrics. The resulting products are improved in heat resistance, water resistance and dye affinity. (83, 105, 106, 150, 162, 286, 290)

By this isocyanate treatment, acetate rayon has been made with reduced solubility (227) and resistant to melting under a hot iron.

Additional work in the textile field concerns isocyanate reactions with cyanamide (127), imparting flame resistance (142) and the preparation of textile assistants from polyurethane-amide derivatives. (170)

In all of these reactions and applications, the polyisocyanates function as cross-linking agents for the cellulose. (208)

In addition, treatment of swollen alginate yarn with hexamethylene diisocyanate renders it resistant to soap and alkali. (236)

Copolymers of ethyl acrylate and propylene isocyanate have been used to treat textiles. (272)

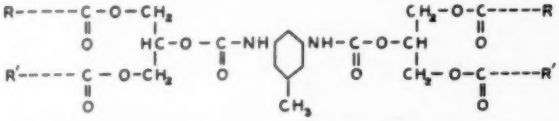
A fluorescent whitening agent for textiles has been prepared from phenylisocyanate and a modified stilbenesulfonic acid. (330)

Tanning Agents:

Hexamethylene diisocyanate is an excellent tanning agent. It yields a tanned leather of high quality with labor requirements of only 3 man-hours, whereas an equivalent chrome leather would require 70 man-hours.

Isocyanate-Modified Drying Oils:

Linseed oil was first modified by alcoholysis, with glycerol or trimethylol propane, to the diglyceride; this was then converted into a dimer by a mol of diisocyanate:



Depending on the degree of alcoholysis (ratio of diglyceride to monoglyceride), oils with any desired viscosity could be prepared without undergoing the bodying process up to 300°C, as in the case of linseed stand oils and heat bodied oils.

A modified linseed oil produced this way surpasses ordinary oils by far and has properties similar to the best German Alkydal L Extra (linseed alkyds). It is superior in the initial and final drying times, the films have higher elasticity, water resistance is obtained faster, it has greater compatibility with other film-formers, and does not thicken upon mixing with basic pigments. Its only disadvantage is its somewhat lower light-fastness. (3)

Recent work in England concerned the preparation of urethane oils and alkyds from the mono- and diglycerides of linseed and dehydrated castor oils with hexamethylene diisocyanate and chlorophenylene diisocyanate. The reactants were processed for 10 minutes at 90-100°C, and let down in mineral thinners. The chlorophenylene diisocyanate alkyds (which were superior to the hexamethylene diiso-produets)

were compared to linseed-pentaerythritol alkyds in clear and pigmented finishes. The isocyanate products were found to be comparable to the conventional alkyds, except for somewhat poorer flow, color retention and durability. (249)

This modification process can also be used to great advantage in beneficiating inferior and semidrying oils, such as blubber, sardine, and other fish oils, into oils which dry rapidly and completely. (107, 108, 109) Recently, hydroxylated soybean oil has been treated with toluene 2,4-diisocyanate, yielding a product with superior properties to dehydrated castor oil. (332)

Similar beneficiation of drying oils occurs with treatment with inorganic polyisocyanates of tin or titanium.

Miscellaneous Uses:

Polyamide articles are rendered water repellant by treatment with isocyanates at 180°C. (110)

Isocyanates have been used with some success in reducing the water affinity of commercial proteins; these treated proteins had greater compatibility with hydrophobic plasticizers. (111, 112) Crude soya lecithin has been deodorized with isocyanates. (274)

Several uses are cited in the literature for isocyanates in the preparation of medicinals and insecticides. (5, 113, 114, 115, 145, 237)

Waxes have been prepared from the reaction products of amino-carboxylic acids and isocyanates. (125)

The cetane number of Diesel fuel is increased by the use of substituted urethanes as a fuel additive. (147)

A gelatin substitute for photographic work has been prepared from polyvinyl isocyanate and various amines. (178) Natural gelatin treated with isocyanates results in products with increased viscosities for photographic film application. (232)

Treatment of zein (corn protein) with phenyl isocyanate decreases its water susceptibility. (241)

One of the oldest and best known uses for isocyanates is in the identification of organic compounds, such as phenols, alcohols, amines and Grignard reagents.

Production Figures and Current Availability:

The production of aliphatic and aromatic diisocyanates at Leverkusen, Germany was on the order of 20 tons/month during 1944. However at the wars end, plans had been made to increase the production of hexamethylene diisocyanate to 100 tons/month and that of toluene 2,4-diisocyanate to 50-80 tons/month. (44)

The applications of Igamid U and Perlon U fiber were restricted almost completely to the aircraft industry. A quantity of 25 tons/month of Perlon U fiber was allocated to the manufacture of parachute fabric and 1 ton/month for the production of bristles.

The Moltoprens (expanded plastics) were produced at the rate of 4 tons/month and supplied to the aircraft and submarine industries in blocks 70x70x10 cm. for use as insulation. (39)

The selling price of the diisocyanates made in Germany during the war was about 85c/lb. The polyurethanes could be made at approximately the same price as the polyamides.

In the United States, two companies undertook to manufacture isocyanates in pilot plant batches after the war. The DuPont company produced hexamethylene diisocyanate and toluene 2,4-diisocyanate for a time in 1946 but discontinued their program in 1947.

DuPont has recently entered the diisocyanate field again with the building of a plant to make polyurethane raw materials, almost speifically directed at the foam trade and the manufacture of polyurethane tires and rubber products. (360)

The Monsanto Chemical ccmpany, at its Anniston, Alabama plant has produced 3 isocyanates; phenyl isocyanate, toluene 2,4-diisocyanate and octadecyi isocyanate. The price of their diisocyanate in 1947 was $7/lb. Their projected carload price at that time was $1.05/lb. In 195 Monsanto and Farbenfabriken Bayer, A. G. of Germany combined to form a jointly owned subsidiary, Mobay Chemical Company, of Anniston, Ala. and St. Louis, Mo. Mobay is building an isocyanate plant at Martinsville, W. Va. and operating the old Monsanto plant at Anniston and importing its line of diisocyanates from Germany. Mobay also plans to manufacture polyesters and blocked diisocyanates and market them as a 2 package deal for coatings, foams, and other applications. (360, 361) Mobay's price for the pure toluene 2,4-diisocyanate is $1.50/lb., and the price for the standard mixture of 2,4- and 2,6- isomers is $1.20/lb. (363) This is a close approach to the 1947 projected price.

A newcomer in the field, the National Aniline Division of Allied Chemical and Dye is now planning to join Mobay and DuPont as a large supplier of polyurethane raw materials. (360, 362) A completely integrated organic isocyanates plant is being built at Moundsville, W. Va. with all chemical raw materials supplied from within the Allied Chemical organization in the immediate vicinity. National plans to produce the following diisocyanates: toluene 2,4-diisocyanate (pure, and 2 mixtures of the 2,4- and 2,6- isomers), 3,3' bitolylene, 4,4'-diisocyanate and Diphenylmethane 4,4'-diisocyanate.

It has been estimated (360) that Mobay, DuPont and National Aniline will initially supply enough raw materials to make about 75 million pounds of polyurethanes a year! (For comparison, DuPont's original nylon capacity was only 4 million pounds a year.)

Other firms which have produced or are producing isocyanates in small quantities in the United States are: Hooker Electrochemical, the Carwin Co. (Conn.) and the Westvaco Chlor-Alkali Division of Food Machinery and Chemical Corp.

With the background of German disclosures of their literature on the isocyanates and their associated resins, American scientific ingenuity should produce a tremendous increase in the amount of research and development and useful applications of these unique raw materials in coatings and allied fields. Then, as Kittner recently said, the exceptional properties of isocyanate coatings, the properties of gloss, gloss retention, hardness, toughness, flexibility, corrosion resistance, chemical resistance, exterior durability, freedom from excess chalking, no checking, high abrasion resistance and outstanding heat resistance—these will be available in the United States. (361)

The polyurethanes and the other isocyanate-based polymers have come of age and have taken their place in the long list of synthetic products which have evaluated the coatings industry to its present high scientific plane.

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(*Turn to page 70*)

CURRENT and FUTURE TRENDS in the PAINT INDUSTRY

By
Anthony Errico
Editor

THIS year, 1955, will go down as the best year in the paint industry's history. Cumulative sales for the first eight months were placed at over one billion dollars. This represents an increase of some 10 percent over the same period in 1954. And it is the first time that sales have topped the billion dollar mark during the first eight month period of the year.

Primary factors contributing to this upswing in paint sales are:

1. High construction activity.
2. Record automobile production.
3. High level of redecoration, maintenance, and improvements among home owners and industry.
4. Continued prosperity and high consumer spending.

The question that naturally arises to many of you here tonight—
Can we expect this brisk activity to be carried through the years ahead? Judging from what the experts predict the general state of our economy for the next 10 years seems most encouraging.

Construction

In the field of construction, there is expected to be a slight dip in residential building during the coming year. This is primarily due to the tightening of mortgages and credits, especially to veterans. However, this slackening in home construction will be countered by further expansion in non-residential buildings, particularly industrial plants, schools, highways, and public works.

According to reports by the Department of Labor the rate of construction of new homes has averaged over a million with 1950 running close to 1½ million units. Estimates for 1955 are expected to reach 1,300,000 units.

This paper was presented at November meeting of the New York Paint and Varnish Production Club, Nov. 3, 1955.

Anthony Errico

Considering the amount of maintenance, improvements and redecoration that must be done on these homes during the coming years, it becomes readily apparent that the paint industry, spurred by the "do-it-yourself" movement, will enjoy high activity in trade sales for many years to come.

Industrial Finishes

Turning to industrial finishes, we find that substantial gains have taken place during the past months. Cumulative sales for industrial finishes for the first eight months amounted to some 410 million dollars, up some 16.6 percent over the same period a year ago. The upswing in this particular field can be directly traced to the record-shattering production of automobiles and high consumer spending for furniture and home appliances of all types. Estimates are that some 8 million passenger cars will be produced during 1955, and this rate of production is expected to carry at least through the first half of 1956. Unquestionably color and styling are important factors in the saleability of today's automobiles. Rich colors, "two-tone" and even "three-tone" effects have induced the buying public to get rid of their old automobile and be in style with a new and colorful model. Over 250 shades are used in this year's models. These include turquoise, cool greens in mint, lime, jade, blues, beiges, yellows, reds, and many hues and shades of the spectrum. This is a tribute to both the paint and pigment manufacturer whose combined technical efforts have made it literally possible to put color on wheels.

One of the most important factors favoring our whole economy is the growing population. The birth rate last year was over four million. With the return of larger families we are going to need bigger homes, more furniture and appliances per home, more automobiles (two cars per family), more schools, colleges, etc.

The gross national product for 1956 is expected to reach 400 billion dollars. Translate this in goods and services, and our economists cannot help but tell us that the general business picture for next year will indeed be very bright.

In such an expanding economy, there is every indication that the gross sales of paint and allied products could approach the two billion dollar mark within the next five years. The question is, how do we reach such a volume? For most of you it will be concerned with developing new products, and improving your present lines.

Easy-To-Use Products

It cannot be denied that the great spurt that has taken place in paint sales is directly attributed to easier-to-use products. For example, latex emulsion paint; gelled paints; flat alkyds; aerosols; paints with simplified color mixing; easier application; little or no odor; easy clean-up—all of these have encouraged the home owner to do more painting.

(Turn to page 80)

Staff pictures by ***Monroe Aller***

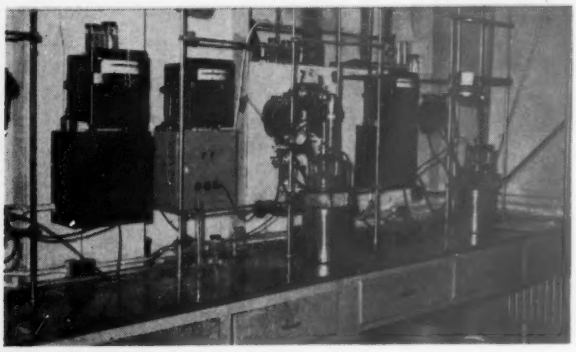
Dr. Krumbhaar shows his patents.

IN 1938, a pilot, taking off from an airfield in Brooklyn with the expressed intention of setting down in Los Angeles, found himself some hours hence, in Dublin, Ireland. Douglas Corrigan was promptly dubbed "Wrong-Way" Corrigan. The same year, Dr. William Krumbhaar, with one kettle built to his specifications founded Krumbhaar Chemicals, Inc., in South Kearny, New Jersey. There is no evidence, however, that any editor tagged him "Right-Way" Krumbhaar. They could have, though, because Dr. Krumbhaar knew just where he wanted to go and what he wanted to do. The record shows that he has succeeded.

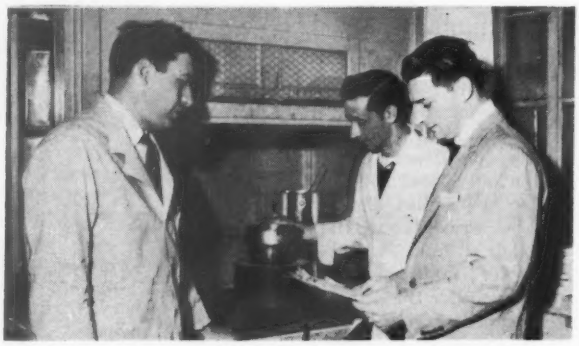
Specializing in custom-made resins with the stress on quality, the company, now employing thirty people, manufactures a complete line of hard resins, phenolics, Penta resins, maleics, Copal synthetics, and Ketone resins. The resins are used in adhesives, lacquers, floor coverings, printing inks, paints and varnishes.

Dr. Krumbhaar, who holds a number of patents in the field, feels that although the use of hard resins in protective coatings has diminished during recent years,

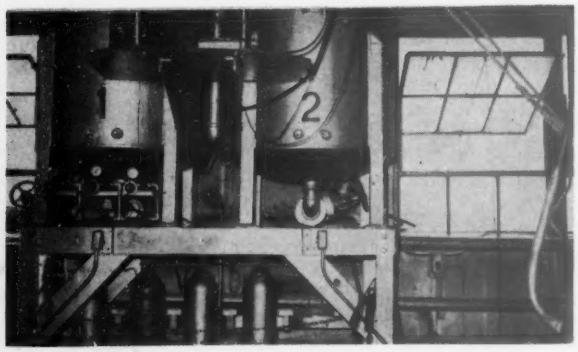
Krumbhaar Resin Plant



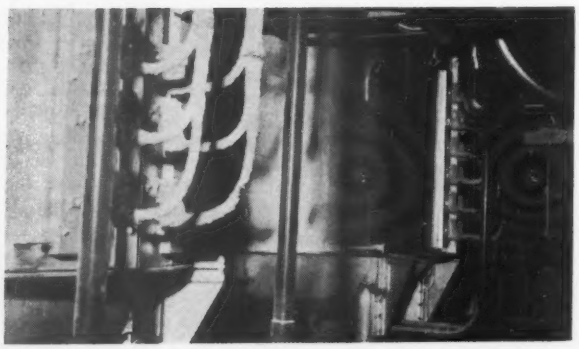
Lab synthesis utilizing automatic temperature control duplicates actual kettle production.



W. Manko, J. Trivsone, and J. Addonizio check and analyze a varnish and resin cooking data.



Phenol-formaldehyde syrup storage tanks used in phenolic production.



Kettles utilize electricity which provides efficient heat.

the trend, within the last year, has been reversed. This he thinks, is primarily due to unprecedented paint sales.

Hard resins, used to upgrade drying oils and with alkyd vehicles in a blend, are still important ingredients, according to Dr. Krumbhaar, in porch and deck enamels.

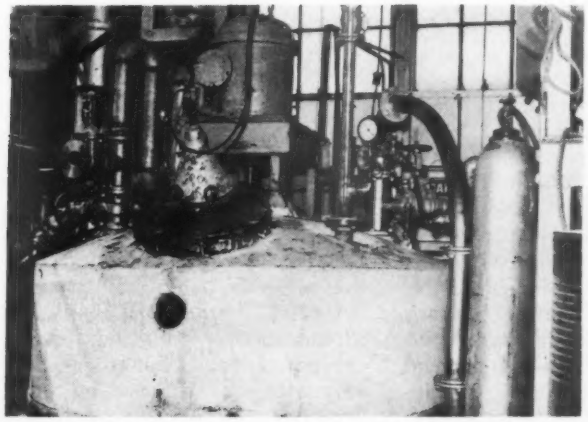
Products Are Always In Demand

Dr. Krumbhaar knows that there is always a market for his products. Spar varnishes and marine finishes, for instance, must be formulated with a 100 per cent phenol-formaldehyde vehicle to have alkalai resistance and good weatherability, and in can coatings, a non-toxic and chemical resistant lining is produced when pure phenolics are blended with tung oil. So, although the need for his products is ever present, Dr. Krumbhaar feels that there is another, equally important reason why his products sell.

"It is," he says, "because we have never failed to stress quality."

PRODUCES:

- ***Phenolics***
- ***Penta Resins***
- ***Maleics***
- ***Copal Synthetics***
- ***Ketone Resins***



2,000 gal. set kettle made to Dr. Krumbhaar's specifications.

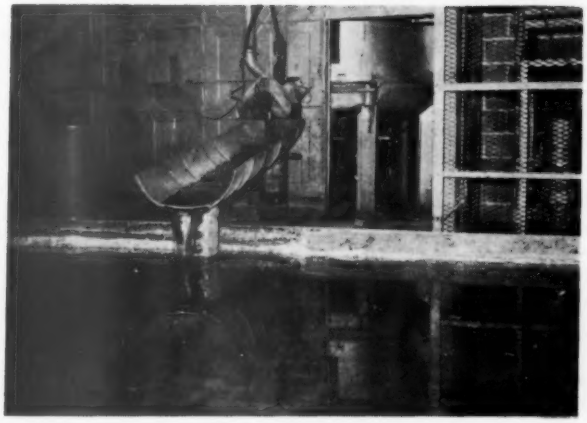


Photo below shows raw materials storage outside of plant.

Molten resin allowed to cool in 400 sq. ft. area before packaging.

for air-dry and low-temperature conversion

CATALYZED PHENOLIC FINISHES

By
K. V. McCullough*

THERMOSETTING phenolic resin coatings for finishing metal have been in use for the past forty years and are an important class of coating materials today. Properly converted to the insoluble, infusible state by baking at temperatures ranging from 275 to 400 deg. F., they produce extremely hard films which are resistant to solvents, fats and oils, soaps and detergents, and most chemicals, with the exception of strong alkalies and oxidizing acids.

For many applications, coatings having these properties would be desirable on other surfaces such as paper and wood. The high temperatures required to bake these coatings, however rule out, their use on these materials. For that reason chemists have sought methods of preparing phenolic resins which could be converted to the desired degree of hardness and chemical resistance at lower temperatures by the addition of a catalyst. Products of this type are reported to have been used in Germany during World War II for coating wooden objects and, more recently, resins of this general class have been produced in this country. While a large market for this type of coating has not developed as yet, increasing interest in catalyzed finishes portend an ever increasing usage. Certainly, the properties obtainable with these coatings warrant serious consideration by those manufacturers who are equipped and staffed to explore new methods of finishing wood and paper.

Resin Description

The most promising of these resins for conversion through the addition of a catalyst are based on phenol with a high formaldehyde content. An extremely pale color is obtainable by incorporating urea (1) in the formulation. The resins are supplied in solution form, at about 50 per cent total solids. As might be expected, the preferred solvents in these solutions are the alcohols.

Catalysts

Acids are used as the catalysts to promote film conversion at room temperature or at slightly elevated temperatures. The type and amount of acid will vary to some extent with the resin composition but the data which will be given here, based on "Bakelite" phenolic baking solution BK-SA-4201, formerly BVQ-12201, should serve as a general guide.

Hydrochloric acid is preferred in coatings to be used on wood. It gives a rapid conversion rate, yet the catalyzed solution is stable in the package for at least two to three weeks. In that respect the catalyzed phenolic resins have a distinct advantage over the other catalyzed finishes because of better "pot-life." Film color obtained through the use of hydrochloric acid as catalyst is very good. The acid is diluted, preferably with "Cellosolve" solvent, prior to use. A convenient solution is made by mixing one part by weight of concentrated acid (37 per cent hydrochloric acid) with four parts by weight of "Cellosolve" solvent. The diluted acid should be added to give 0.75 to 1.5 per cent of contained concentrated acid (37 per cent hydrochloric acid) based on the weight of resin solids. This is equivalent to adding 3¾ to 7½ parts by weight of the "Cello-

*Assistant Director of Development, Bakelite Co., Div. of Union Carbide and Carbon Corp. This paper was presented at the Symposium on Catalyzed Coatings before the Technical Committee of the National Paint, Varnish and Lacquer Assoc., Boca Raton, Florida, Feb. 24, 1955.
The terms "Bakelite" and "Cellosolve" are registered trade-marks of Union Carbide and Carbon Corp.

solve" solvent-acid solution to 100 parts of "Bakelite" phenolic resin solution BKSA-4201 solids. Within this range, the keeping time of the accelerated resin solution at 30 per cent total non-volatile will vary between two and six weeks if stored in glass or phenolic lined drums at 77 deg. F. (25 deg. C.). This recommended range of accelerator addition is satisfactory both for air-drying and for force-drying at temperatures up to 140 deg. F. (60 deg. C.). When the coatings are force-dried at 140 deg. F., the amount of accelerator can be reduced to the lower part of the range indicated above.

With the addition of 1.0 to 1.5 per cent concentrated hydrochloric acid based on the weight of resin solids, the coating dries to a tack-free state in one hour and can be sanded in three to four hours. Short bakes of up to an hour at 140 deg. F. (60 deg. C.) convert the coating so thoroughly that it even can be sanded hot.

Organic acids, such as oxalic and maleic, are preferred in coatings for use on paper and cardboard since they are not as destructive as hydrochloric acid. These acids are not as powerful in their effect so a higher percentage by weight must be used. A range of 1.5 to 3.0 per cent based on total resin solids is suggested.

Specific data on the effect of the type and amount of acid are given in Table I. Acetone resistance was used as the criterion for film conversion. The acetone insoluble film is far beyond the tack-free stage. It will be apparent from the results shown in the table that film conversion on air-drying or baking at low temperatures continues after the first twenty-four hours.

Performance of BSKA-4201 With Various Catalysts

Catalyst	Catalyst Content Based on Resin Solids	Conversion Conditions	Conversion after 24 hrs.	Conversion after 1 week
Conc. HC1 (37%)	0.25%	Air-dry	N. C.	N. C.
" " "	0.50%	" "	N. C.	N. C.
" " "	0.75%	" "	N. C.	C.
" " "	0.75%	Bake 1 hr. at 140°F., then air-dry	S.	C.
" " "	1.00%	Air-dry	S.	C.
" " "	1.50%	" "	C.	C.
Oxalic acid*	1.50%	" "	N. C.	C.
" "	1.50%	Bake 1 hr. at 140°F., then air-dry	S.	C.
Maleic acid*	1.50%	Air-dry	N. C.	C.
" "	1.50%	Bake 1 hr. at 140°F., then air-dry	S.	C.

Key
N. C.—not converted.
C.—converted.
S.—softens under acetone but does not wash off.
*—Oxalic and maleic acids added as 25% solutions in denatured ethanol.

Table I

Precautions

The catalyst solution, being acidic, must be stored and shipped in glass or polyethylene bottles.

Phenolic resin solutions discolor in the presence of iron so uncoated steel or black iron containers are not suitable. Tinplate and galvanized containers are also attacked, resulting in discoloration of the resin solution. Containers lined with baked phenolic coatings have proven to be entirely satisfactory, and, for that reason, this type of packaging is used for BKSA-4201. Steel containers with a removable polyethylene bag liner should be another good possibility.

The manufacturer of coatings based on this type of resin and the ultimate user must also bear these precautions in mind regarding the equipment used in mixing and handling these acid-catalyzed solutions. Stainless steel, "Monel" metal, glass, and steel protected with a baked phenolic coating are all safe to use. Once again, uncoated steel and galvanized equipment should not be used.

Use on Wood

The catalyzed phenolic resins are particularly suited for finishing wood. They are very fast in drying speed and have exceptionally fine adhesion, toughness, abrasion resistance and depth of gloss. Film color and color retention on aging are similar to that obtainable with nitrocellulose—maleic modified rosin ester lacquers.

Finishing close-grain woods, such as maple, birch, poplar, and gumwood, is relatively simple. Two or three coats of BKSA-4201, containing the acid catalyst, and applied at about 30 per cent total solids, will be sufficient. Each coat should be allowed to air-dry for three hours and then be lightly sanded between coats. The final coat may be rubbed and polished, if desired, using conventional rubbing compounds. A typical clear finish for wood, which may be used both as a sealer and finish coat, is prepared as outlined in Table II.

Open-grain woods, such as oak, mahogany and walnut require a wood filler and this presents a special problem. The catalyzed phenolic resins do not adhere either to conventional oil-base wood fillers or to sealers based on nitrocellulose or shellac. Special fillers, formulated with urea-formaldehyde resins and oils (2), are quite satisfactory and give a surface to which BKSA-4201 will adhere. It is also possible to prepare fillers with BKSA-4201 itself, and the formulation in Table III is such an example.

If this filler dries too long before wiping off, it is sometimes difficult to remove.

A typical finishing schedule for open-grain woods, using a filler based on BKSA-4201 is as follows:

Finishing of Open-Grain Woods

1. Apply, by brush or spray, one coat of filler.
2. Allow to air-dry 15 to 20 minutes.
3. Cross-grain wipe with a clean rag until all excess filler has been removed.

"Bakelite" Phenolic Resin Solution BKSA-4201 Clear Topcoat

	Pounds	Gallons
BKSA-4201 resin solution (50% N. V.)	475.0	54.0
Ethanol (methanol denatured)	298.0	43.9
Accelerator solution (See below)	17.8*	2.1
	790.8	100.0
Non-volatile	30%	
Weight per gallon	7.8 to 8.0 lb.	

Accelerator Solution

	Pound
"Cellosolve" solvent	80
Concentrated hydrochloric acid	20
	100

*This quantity gives a concentration of 1.5% hydrochloric acid (37%) on the weight of BKSA-4201 solids.

Pigments—When a low sheen or rubbed effect is desired, flatting pigments, such as silica aerogel, may be ground into the resin to reduce the gloss. Five parts of the silica aerogel to 100 parts of BKSA-4201 resin solution is recommended as a starting point. The pigment should be thoroughly dispersed in the resin solution by an overnight grind in a pebble mill. Zinc stearate and other metallic soaps are not satisfactory as flatting agents in this type of resin, because they tend to reduce the adhesion of the coating.

Table II

4. Air-dry overnight, or air-dry 20 minutes and then bake for one hour at 140°F. (60°C.).
5. Apply, by spray, one coat of "Bakelite" phenolic resin solution BKSA-4201, containing accelerator and thinned to approximately 30% solids.
6. Air-dry for three hours.
7. Sand lightly, then apply one double-coat of BKSA-4201 resin solution containing accelerator and thinned to approximately 30% solids.
8. When final coat is dry, rub and polish.

The schedule can also be shortened considerably by force drying each finish coat for one hour at 120 deg. F. to 140 deg. F. (49 deg. C. to 60 deg. C.).

Formula Suggestion
UF-1780 — Wood Filler

	Pounds	Gallons	Percentage by Weight
Domestic Terra Alba	338	17.20	22.95
Magnesium silicate	338	14.21	22.95
Silica	338	15.57	22.95
BKSA-4201 (50% N. V.)	166	18.71	11.26
"Santicizer" 140	124	12.48	8.42
"Cellosolve" solvent	169	21.83	11.47
	1473	100.00	100.00

Manufacturing Procedure

Mix ingredients thoroughly in a pony mixer. Prior to use, add sufficient hydrochloric acid-"Cellosolve" solvent mixture to obtain a weight of 1.5% hydrochloric acid (37%) on the phenolic resin solution BKSA-4201 solids.

Properties

Weight per gallon	14.7 lb.
Total solids	83.3%
Thinner	"Cellosolve" solvent or n-butyl alcohol

Color: This is a "natural" filler which may be colored as desired by the proper choice of pigments.

Table III

Since the catalyzed phenolic coating is acidic, certain types of wood stains which are lacking in acid resistance cannot be used. This is not a major problem, however, since acid-resistant stains may be made with dyes obtainable from all of the leading producers of such materials.

These coatings adhere very well to wood but are lacking in adhesion to metals. Because of reactivity with the metals, the acid catalysts are reduced in their activity.

Uses

In Europe the catalyzed phenolic coatings have been used as finishes for skis and wooden railroad car seats. In this country they have found use in coating wooden milk bottle cases, paintbrush handles, brush backs, shoe lasts, and small articles of furniture. They offer excellent possibilities for coating school furniture and articles of household furniture where exceptional abrasion and chemical resistance is required. Finishes of this sort on end tables, cocktail tables, and bar tops should have a ready market since they withstand alcohol and other solvents and have better resistance to scratching and abrasion than ordinary varnish or lacquer coatings.

The catalyzed phenolic coatings also offer excellent properties for specialized paper coatings. Penetration into the paper may be minimized by grinding in a small amount of silica aerogel.

Catalyzed phenolic coatings are fast drying, have excellent hardness, abrasion resistance, gloss, and resistance to solvents, fats, oils, and most chemicals. They are especially useful on wood and paper but are not suitable for coating metals. They have better "pot-life" after the addition of the catalyst than other types of catalyzed coatings. Their adhesion to oil-base fillers and conventional paints and varnishes is poor so they should be used directly over bare wood or paper. However, special types of fillers, if required, can be prepared for use under these finishes.

References
(1) U. S. Patent-1,717,600
(2) U. S. Patent-2,630,395

NEWS

New Lambco Fla. Plant To Be Headed By V. L. Sinisi

Charles E. Lambert, president of the Lambert Corp., has announced the establishment of a protective coating manufacturing plant in Orlando, Fla.

The plant will manufacture and distribute a complete line of Lambert paints, varnishes, lacquers, and waterproofings under the "Lamco" label.

Vic L. Sinisi, who has had 22 years experience in the sale and manufacture of paint and waterproofing products, has been elected president of the Lambert Corporation of Florida. In addition to Florida, a sales organization will cover Georgia, North and South Carolina and Tennessee.

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Little Opens D.C. Office

Arthur D. Little, Inc. consulting research firm of Cambridge, Mass., has opened a branch office in Washington, D. C.

Purpose of the new branch is to help maintain closer relations with government agencies, enable ADL to keep in touch with the many professional and trade associations having Washington headquarters, and serve as liaison with clients in the southeastern United States.

Fein's Tin Can Co. Joins U. S. Hoffman Machinery

Fein's Tin Can Co., Brooklyn, N.Y., has joined the U. S. Hoffman Machinery Corp. as an independent subsidiary, and Irving Fein, president and executive director of the company has become a member of the board of directors of U.S. Hoffman as a result of this move.

Irving Fein

Mr. Fein also remains as president and executive director of the other companies known as the Fein Group of tin can companies, including Atlas Can Corp. and Peerless Can Corp., Brooklyn, N.Y., Commercial Can Corp., Newark, N.J. and Standard Can Corp., Pittsburgh, Pa.

In announcing the transaction, Mr. Fein stated that he and his associates have retained a substantial financial interest in the companies and that the entire executive and production staffs remain intact.

The Fein's Tin Can Company was organized in 1917 with Mr. Fein's father, Hyman Fein, as president and Irving Fein as vice-president. In 1946, his father passed away and Irving succeeded to the presidency of this and all the other can companies of the group.

PICCO West Coast Office Headed By A. Patureau

Pennsylvania Industrial Chemical Corp. has announced the opening of a new West Coast district office in Los Angeles, and the appointment of Arthur Patureau as West Coast manager.

Arthur Patureau

Mr. Patureau has a wide background in chemical and allied fields. Most recently he has been associated with Minneapolis-Honeywell Regulator Co., serving as reactor controls consultant to Westinghouse Atomic Power Division in the development of the Nautilus atomic-powered submarine engine. Previously he had been chief application engineer for Fischer and Porter Co., manufacturer of process control instruments and chlorination equipment.

•

50 Years With Company

Douglas A. Whittaker, president and managing director of the Sherwin-Williams Co. of Canada Ltd., recently celebrated fifty years of association with the company. He was presented with a service pin by A. G. Pinard, executive vice president, on behalf of members of "Organization Old Guard"—employees with 25 or more years with the company in Canada.

An annual "must" takes place again as Harold L. Davis, left, general manager of the D. H. Litter Co., Inc. presents the Nuodex gavel to Irving Flaumenhaft, the newly elected president of the New York Paint & Varnish Production Club. Davis has made this presentation for nine successive years. Pictured in the right hand photo are the officers of the club, left to right, J. E. Dunn, Jr., treasurer; E. S. Paterno, vice president; President Flaumenhaft and F. J. Rogers, secretary.

NEWS

Matherson-Selig Opens New Plant, Promotes

Matherson-Selig Co., manufacturer of color cards and paint chips, has "gone suburban" with a streamlined plant designed and built around its own operation. The new plant is in Harwood Heights, Ill., just 30 minutes from Chicago's loop.

The plant is called ideally suited to the firm's tendency towards automation. Just recently installed, for example, is a newly developed machine which applies the paint to the chip paper at the rate of 250 sq. ft. per minute. The machine does the work of 14 people and can be set up for a new color in just three minutes, with only one inch waste strip.

Two promotions in the company were announced by A. P. Neer, president, and I. Finder, Secretary-Treasurer: Joseph Bobis has been made plant manager, and Anthony Bobis, Quality Control Supervisor.

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S. W. Paint Convention

The 1956 Southwestern Paint Convention, hosted by the Dallas Paint and Varnish Production Club, will be held at the Statler-Hilton Hotel in Dallas May 10-12.

FELLOWSHIP WINNERS: Dr. Wouter Bosch, center, Professor and Chairman of the Department of Paints, Varnishes and Lacquers at North Dakota Agricultural College, and four of his students who have been awarded an Ernest T. Trigg Foundation Fellowship for the academic year 1955-1956. From left to right these students are James Harvey, Arthur Leadbetter, Michael Fogel, and Arthur Landau.

Specify Molybdate Orange For Military Aircraft

Improvements in commercially available molybdate orange pigments have been recognized by the inclusion of molybdate orange in the new specification for aircraft gloss enamel (MIL-E-7729A) and the new Amendment-3 to the specification (MIL-L-7178) for gloss cellulose nitrate lacquer for aircraft.

In MIL-E-7729A, molybdate orange replaces chrome orange as the pigment specified for international orange (color no. 508), and it is among the specified pigments that may be used in olive drab (color no. 504) and orange yellow (color no. 506).

The new amendment to MIL-L-7178, the specification for gloss lacquers for aircraft use, also specifies molybdate orange in place of chrome yellow or chrome orange in international orange.

Because orange has such high visibility, it is used extensively on the wing tips, trailing edges, tails, noses, etc. of aircraft as an aid to safety in operation.

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Paint Industry Praised

The paint industry was praised at the recent Packaging Institute Forum for its cooperation in two notable developments in the production of collapsible metal tubes for pharmaceutical preparations.

Because of the industry's cooperation, prescription tubes now have superior interior coatings to maintain the potency of the drugs and easily removable labels for the druggists' convenience, the forum was told. The meeting was held last month at the Hotel Statler in New York City.

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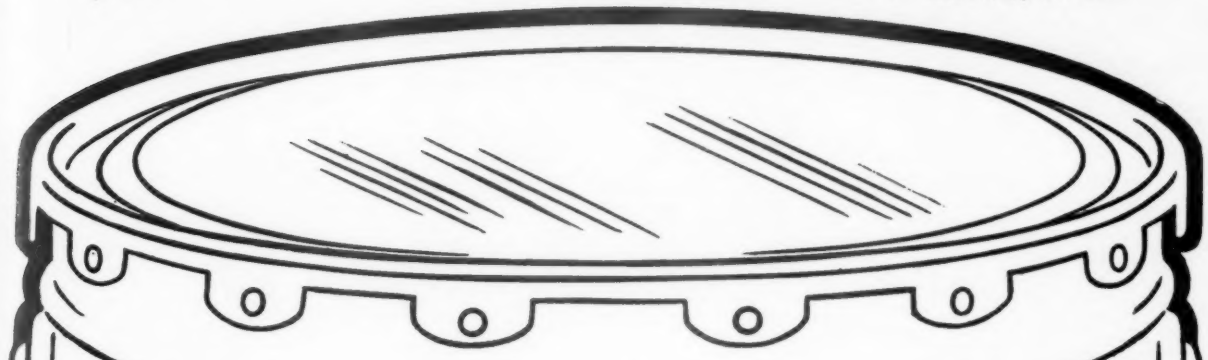
Corrosion Engineers Elect

The National Association of Corrosion Engineers' South Central Region has elected John W. Nee chairman for the one-year term beginning January 1, 1956.

Mr. Nee is vice-president and technical director of the Briner Paint Manufacturing Co. of Corpus Christi and is on the editorial review board of *Corrosion Magazine*.

Jones & Laughlin Steel Corporation Container Division's new plant at Port Arthur, Texas. It houses a practically all-automatic production line for steel drum and container manufacturing.

Make friends with Continental's steel containers



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FLARING PAILS

Inside and out, Continental steel flaring pails are built to give your dry, powdered and viscous products the fullest measure of protection. Sales appeal, however, is just as much a part of these pails as sturdy construction. Brightly lithographed by Continental craftsmen, each container becomes part of a handsome package "family." And long after the original contents are gone, your name on these handy re-usable pails will help you sell not just one, but *all* the products in your line. Let us show you how Continental flaring pails can work for you. Call anytime.

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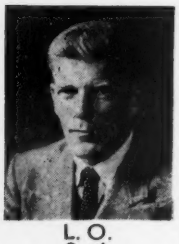
NEWS

Jelled Paints, U.S. Find, Stirs Interest In Europe

Interest in the new jelled paints has spread to Europe, at both trade and consumer levels, according to Linus O. Smith, president of T. F. Washburn Co., Chicago, who has just returned from a month of meetings with paint manufacturers and dealers in England, Sweden, Norway, Holland and Switzerland.



L. O. Smith

Manufacturers abroad feel, he said, that the easily handled no-drip paints, made from "Burnok," the thixotropic vehicle developed by Washburn, will advance paint sales in the do-it-yourself field in Europe, just as they have in the United States. That market, a growing one in the countries Mr. Smith visited, is not comparable with the size of the American market because labor still is cheaper in Europe.

The keen interest of the public as well as the trade was notable in Norway especially, Mr. Smith reports. The Alf Bjerkes Co. there arranged a press interview with newspapers represented as well as the technical magazines at which time Mr. Smith was asked many questions about thixotropic paints.

Agreements giving exclusive rights in limited areas have been made with Wilhelm Becker of Sweden for Scandinavia; Emil Scheller in Switzerland; W. Herman Slade & Co., Pty. Ltd., Australia for Australia, and New Zealand; and Cray Valley Products Co., Ltd., England for the British Isles.

•

Open New Orleans Office

A new sales office in New Orleans, La. has been opened by Carbide and Carbon Chemicals Co., a Division of Union Carbide and Carbon Corp.

CHECKING PLANS: The policy committee of Goodyear Tire and Rubber Company's chemical division checks building plans on the site of the $3,500,000 construction project now under way in Akron, Ohio which will boost the company's production of "Chemigum" rubbers and latices. In the back row, from left to right, are V. L. Petersen, manager, chemical purchasing; R. E. Workman, assistant to general manager of the chemical division; R. C. Waller, head of high polymer research section; J. R. Creager, manager of chemical production; and M. J. Rhoad, manager of rubber and rubber chemicals. In front row, left to right: H. R. Thies, general manager of the chemical division; W. N. Reese, division foreman of chemical products merchandise; M. J. DeFrance, manager of chemical product development; and R. S. Earhart, assistant general sales manager.

Hold Technical Seminar On Synthetic Latex Polymers

A technical seminar on synthetic latex polymers was presented to the northwest paper industry recently by the chemical division of the Goodyear Tire and Rubber Co. The seminar was held at the Crown-Zellerbach Corporation's new research laboratories at Camas, Wash.

More than 100 representatives from some 25 companies in the paint, paper, and lumber industries attended the technical meetings.

Talks offered by five Goodyear speakers were illustrated by both black and white and color slides. Development, production, evaluation, properties and use of synthetic latices were the main topics presented.

Principal speaker was Herman R. Thies, general manager of the chemical division, who opened the session with "The Synthetic Latex Industry," giving a word picture of the scope of this relatively new industry.

Dr. J. D. D'Ianni, assistant to the vice president in charge of research and development, discussed the "Theoretical Consideration of Polymerization and Latex Characteristics." Later in the program, he described "The Course of a Product Development."

"Sources of Materials for Latex Manufacture" was given during the morning session by R. S. Earhart, assistant general sales manager of the chemical division. He opened the afternoon session with a pictorial slide story of "The Production of Synthetic Latex" and later described the "Types of Latex Commercially Available."

Two papers were delivered by Willard C. Smith, latex and adhesives section head for the chemical materials development department. "Properties of Latex Systems and Evaluation Procedures" was offered in the morning, and during the afternoon, Smith discussed "The Influence of Latex Variants on Important Performance Characteristics."

Earl W. Scott, sales service representative for the chemical division's coatings department, presented "A survey of Latex Applications and Potentials" in the various coatings fields.

Thies concluded the meetings by presenting a summation of the important technical and educational points presented during the program.

Hosts for the seminar were Dr. Jack Barton, manager of the development department, and Dr. Hutton Theller, manager of the research department, for the Crown Zellerbach Corp.

Armour redesigns alkyd acid line!

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And when you read the product descriptions which follow, you'll quickly see more good reasons why these high quality Armour alkyd acids can improve your processing. Choose and write Armour today for test samples and our new product bulletin.

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Neo-Fat 127—For applications requiring better drying characteristics. Excellent initial color, heat stability and narrow iodine range give uniform air-dry alkyds.

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Neo-Fat 122	120-123	196-203	28 Max.	5 Gard. Max.	*
Neo-Fat 127	125-128	196-203	27 Max.	4 Gard. Max.	*
Neo-Fat 132	130-133	196-203	27 Max.	3 Gard. Max.	*
Neo-Fat 140	138-142	195-200	5 Max.	2 Gard. Max.	*

*G.E. Heat Test—11 Gard. Max.; S&W Heat Test—7 Gard. Max.

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NEWS

Better Paints Discussed At Flax Institute Meeting

Better paints, coatings, and chemical products for both homes and industry through increased research on linseed oil, was discussed by a scientific team of chemists, agronomists, pathologists, grain specialists, and oil and paint specialists who attended the meeting of the Flax Institute of the United States. The meeting was held Nov. 17-18 at the Nicollet Hotel in Minneapolis.

The long range goal to be achieved by this cooperative effort of flax processing firms and scientists is to expand the market for linseed oil products thus insuring upper midwest farmers of better markets for their flax crop.

About 100 leaders from business colleges, agricultural and government met with the committee on Co-ordination of Flax Research in order to plan joint efforts.

Among the leaders of the two-day convention were: Dr. J. O. Culbertson, USDA, St. Paul; Howard Scheu, Minneapolis, Robert L. Terrill, Buffalo, N.Y. Spencer Kellogg & Sons, Dr. W. Dayton Maclay, Dr. J. C. Cowan, USDA Agricultural Research Service, Peoria, Ill.; Guy Wilson and Max Kantor, Cargill, Inc., Minneapolis; Marvin Formo, Archer-Daniels-Midland Co., Minneapolis; J. V. Hunn, Sherwin-Williams Co., Cleveland, Ohio; Francis Scofield, National Paint, Varnish and Lacquer Association, Washington, D.C.; Obed Wyum, member of Fats and Oils Advisory Committee, Rutland, N. D.; J. E. Thigpen, USDA Commodity Stabilization Service, Washington, D. C.

From the University of Minnesota were: J. J. Christensen, R. S. Dunham, A. C. Caldwell, S. A. Engene, J. O. Culbertson (USDA). V. E. Comstock (USDA), and W, M. Myers, who acted as chairman of the "Flax in Minnesota" panel.

From the North Dakota Agricultural College the representatives were: C. O. Clagett, and Harold Klosterman.

South Dakota State College was represented by Oscar Olson, Mark Johnson, and V. A. Dirks.

Other speakers were C. E. Reddy, A. L. Bakke, Iowa State College; A. G. Plessers, Department of Agriculture, Ontario, Canada. A. H. Post, Montana State College, general chairman of co-ordination of Flax Research.

•

Move Two Sales Offices

Sales offices for Eastman Chemical Products, Inc., in both Dayton, Ohio, and Houston, Texas, have been removed to new addresses. The former office handles sales for Eastman Tenite plastics, while the latter handles sales for both Tenite plastics and Eastman industrial chemicals.

In Dayton, the new address is 2600 Far Hills Ave.; in Houston, 704 Texas National Bank Bldg., 1300 Main St.

•

Steel Company Purchase

Inland Steel Co. and the Cleveland Steel Barrel Co. have announced agreement on terms of a contract under which the Chicago steel company would purchase the Ohio manufacturer of barrels and pails, subject to clearance by the appropriate government agencies.

Manufacturers of Latex Emulsion Paints...

WATER SOLUBLE
Fe_2O_3 Al_2O_3 CaO MgO
"440" Brown 0.0043% 0.0057% 0.0970% 0.0310%
"964" Brown 0.0026 0.0170 0.0370 0.0470
"1011" Ochre 0.0023 0.0077 0.0020 0.0040
"1033" Ochre 0.0057 0.0043 0.0050 0.0120
"717" Indian Red None 0.0170 0.0050 0.1400
IROX Reds 0.0004 0.0096 0.0100 0.0500
IROX Yellows 0.0033 0.0117 0.0050 0.0050
"1640" Red Oxide 0.0038 0.0312 0.0050 0.0190
"1874" Red Oxide 0.0042 0.0058 0.0025 0.0110
"395" Raw Sienna 0.0004 0.0195 0.1400 0.0140
SOFTEX Reds
SOFTEX Browns
No figures available as water soluble salts run low or not at all. It is impractical to evaluate them.
All Water Solubles shown are averages of recent batches.

THESE FACTS MAY HELP KEEP YOUR PRODUCTION FREE OF TROUBLESOME VEHICLE PROBLEMS!

Certain latex emulsion paint systems present special vehicle problems... Where these problems can be avoided through careful selection of iron oxide colors, consider the properties of REICHARD-COULSTON pigments.

Which of our pigments best meets your needs? Our laboratories have made extensive evaluation tests to help you determine this.

Take the case of Styrene-Butadiene and Post Plasticized Polystyrene emulsion systems...

For pigments practically free of di- and tri-valent soluble salts, we recommend the REICHARD-COULSTON pigments shown on the chart.

In the case of Polyvinyl Acetate and Acrylic emulsion systems where soluble salts requirements are not as critical, these same pigments can also, of course, be used.

See how REICHARD-COULSTON pigments can help keep your latex emulsion paint production free of vehicle problems. In requesting free samples of pigments listed in the chart, please state amount required for your test.

Natural RC IRON OXIDE PIGMENTS *Synthetic*

Reichard-Coulston, Inc.

15 EAST 26th STREET, NEW YORK 10, N. Y.

for the paint, varnish and lacquer industry

SOLVENTS

acetone
n-butyl acetate
ethyl acetate
2-ethylhexyl alcohol
isobutyl acetate
isobutyl alcohol
isopropyl acetate
Tecsol® (95% proprietary solvent)

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dibutyl phthalate
diethyl phthalate
dioctyl phthalate (DOP)
di-isooctyl phthalate (DIOP)
di-(methoxyethyl) phthalate
dimethyl phthalate
di-isobutyl phthalate

FILM FORMERS

cellulose acetate
cellulose acetate butyrate

Stocks of most of these Eastman chemicals are carried in the larger industrial centers of the United States. For further information, write or call our nearest sales office.

Eastman
CHEMICAL PRODUCTS, INC.,
KINGSPORT, TENNESSEE
Subsidiary of EASTMAN KODAK COMPANY

SALES OFFICES: **Eastman Chemical Products, Inc.,** Kingsport, Tennessee; New York—260 Madison Ave.; Framingham, Mass.—65 Concord Street; Cleveland—Terminal Tower Bldg.; Cincinnati—Carew Tower; Chicago—360 N. Michigan Ave.; St. Louis—Continental Bldg.; Houston—412 Main St. **West Coast: Wilson Meyer Co.,** San Francisco—333 Montgomery St.; Los Angeles—4800 District Blvd.; Portland—520 S. W. Sixth Ave.; Salt Lake City—73 S. Main St.; Seattle—821 Second Ave.

YOU SHOULD KNOW ABOUT

This latex has a

BAKELITE BRAND LATEX WC-130

a splendid "inside" story

Designed as a High Quality Vehicle for Interior Wall Sealers and Coatings to Provide Superior Color, Toughness, and Resistance to Alkalis and Cleaning Compounds.

WC-130, a BAKELITE Brand vinyl acetate resin latex, is a smooth, stable, fast-filming aqueous dispersion. Developed specifically for coatings applications, this latex features marked resistance to foaming and unusual electrolyte tolerance. Paint films based on this latex possess good water resistance together with all these other advantages . . . and show outstanding *retention* of these superior film properties on aging.

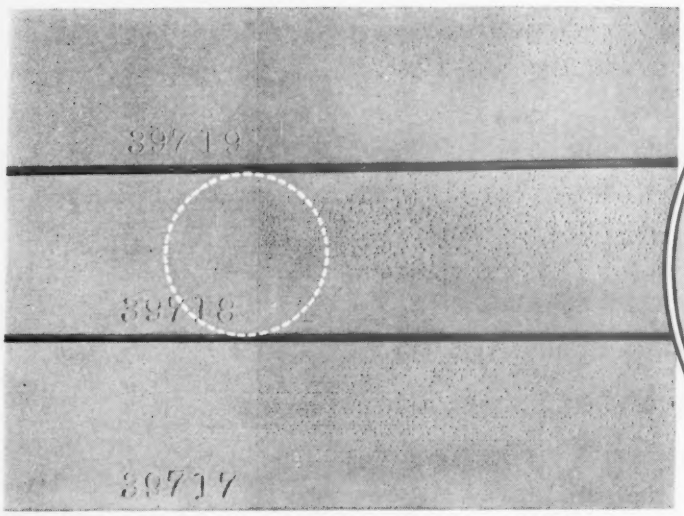
Initial exposure data on vinyl acetate resin latices looks very promising. Exterior paint formulations based on latex WC-130 are being exposure tested at sites in Vermont, New Jersey, Pennsylvania and Florida. Bakelite Company's Development Laboratories are continuing extensive investigations of latex WC-130 in many other coatings applications. Advance Technical Bulletin No. 1 gives formulations under test on exterior exposures.

For your information and assistance Technical Bulletin No. 225 provides suggested formulations for interior applications such as plaster and wallboard sealer, various pigmented interior wall paints, wall patching compound, and tinting base together with manufacturing procedure and properties of these products made with BAKELITE latex WC-130. A list of tested pigments and extenders, plus cost data are included. For your free copies of Technical Bulletins No. 1 and No. 225, write Dept. GX-153

BAKELITE COMPANY, *A Division of Union Carbide and Carbon Corporation* UCC 30 East 42nd Street, New York 17, N. Y.

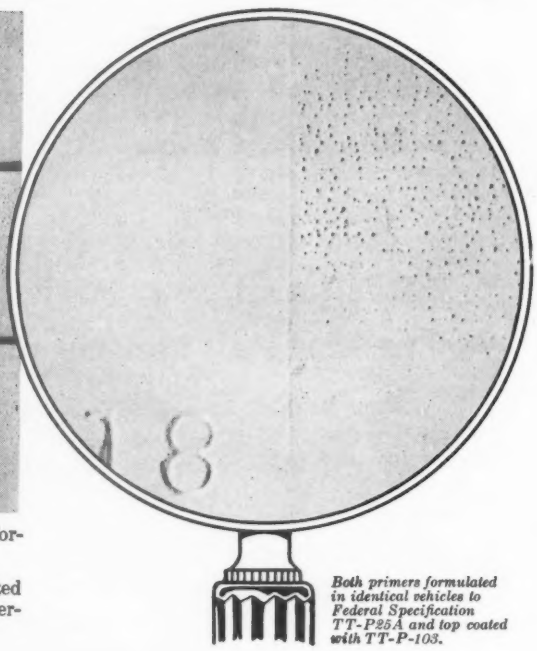
The term BAKELITE and the Trefoil Symbol are registered trade-marks of UCC

Compare the difference in these two paint primers!



Test panels on left show that *no blistering* occurred in the paint primer formulated with Eagle-Picher Super Sublimed White Lead.

Test panels on right show definite *blistering* in the paint primer formulated with an equal volume of a highly reactive lead pigment. Compare the difference in the magnified area on extreme right.



Both primers formulated in identical vehicles to Federal Specification TT-P-25A and top coated with TT-P-103.

EAGLE-PICHER
SUPER SUBLIMED WHITE LEAD
provides greater blister resistance!

Accelerated tests prove that blistering—caused by loss of adhesion when moisture content is high—*does not occur* when quality house paint primers are formulated with Eagle-Picher Super Sublimed White Lead. Even under extremely adverse moisture conditions, these primers show very little water absorption, low volumetric swelling and superior adhesive characteristics.

Insure greater blister resistance in your house paint primers. Specify Eagle-Picher Super Sublimed White Lead. Remember, Eagle-Picher maintains rigid quality control from ore to finished pigment . . . and as the largest producer of *both* zinc and lead pigments provides unequalled and unbiased customer service!

THE FORMULATION

	Pounds per gal.
#41 Super Sublimed White Lead	4.64 lbs.
Titanium Dioxide—Rutile	1.13
Magnesium Silicate	3.41
Raw Linseed Oil	1.32
Z Linseed Oil	2.47
Mineral Spirits	1.62
24% Pb	.06
6% Mn	.03
	14.68 lbs.

PVC—35.5%

Since 1843

EAGLE PICHER

THE EAGLE-PICHER COMPANY

Largest Producer of Both Zinc and Lead Pigments

General Offices: Cincinnati 1, Ohio

Regional Sales Offices: Chicago, Cleveland, Dallas, New York, Philadelphia, Pittsburgh

NEW MATERIALS & EQUIPMENT

A MONTHLY MARKET SURVEY

This section is intended to keep our readers informed of new materials and equipment. While every effort is made to include only reputable products, their presence here does not constitute an official endorsement.

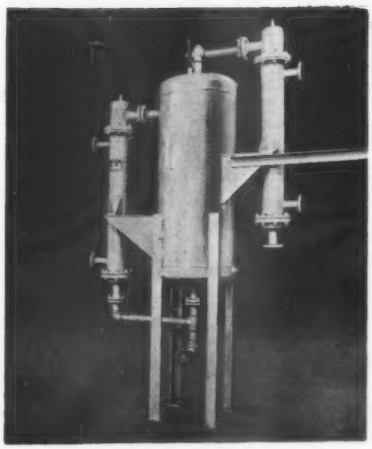
PVA VEHICLE
For Full Line Products

Paint manufacturers can now produce a full line of top quality PVA emulsion paints by using "Cal-Vyn W-1000" with only the two additional ingredients of pigment and water, according to manufacturer. The base of this vehicle is a special paint grade polyvinyl acetate manufactured exclusively by the company.

Paints made from product are said to have none of the drawbacks experienced in improperly and incompletely formulated PVA paints such as pigment settling, caking, excessive clear top liquid, separation, unstable viscosity, uncontinuous film formation, excessive reduction in pH, putrefaction or mould odor, excessive can corrosion, poor washability, very poor retouchability, slow dry, etc. Calvert-Mount Winans Co., Annapolis Ave. and B. & O. Railroad, Baltimore 30, Md.

EPOXY CURING AGENT
Low Viscosity

"Epon Curing Agent T", now available in experimental quantities, is a low viscosity, high boiling liquid expected to find its principal use in room temperature contact pressure laminating. A concentration of 25 per cent of product, based on weight of resin used, is said to provide the optimum rate of cure. At this concentration, a wet lay-up contact pressure laminate will be tack-free in about four hours at room temperature, according to company. Shell Chemical Corp., 50 W. 50 St., New York 20, N. Y.



STRUTHERS-WELLS

RECLAIMING STILL
For Re-Use of Solvents

A solvent reclaiming still, designed to eliminate impurities in solvents and allow their re-use, is available for either batch or semi-continuous operation. Unit is made in five standard sizes in capacities to 300 gallons per hour. The heating medium is steam, with water required for use in the solvent condenser.

The still ordinarily is constructed of carbon steel, but can be supplied in stainless alloys and non-ferrous construction. Design is based on standard stock parts, permitting quick shipment. Process Equipment Department, Struthers Wells Corp., Warren, Pa.

GREEN TONER
Has Alkalai Resistance

A green toner, "Pigment Green B 15-4010," is said to combine unusually good dispersion with excellent alkali and lime resistance. It was developed principally for the paint and floor covering industries to provide a pigment having exceptional resistance to soaps, alkaline cleaners and lime plaster, according to manufacturer. Pigments Div., American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N.Y.

PUMP-MOTOR UNIT
For Transfer Applications

A close-coupled, portable electric motor and pump unit with dry suction lift of approximately 15 feet is designated Model 4720. The unit consists of a Stainless Steel (Type 316) Self-priming pump mounted directly on the shaft of a ¼-hp., 1725 rpm. electric motor. It utilizes the neoprene impeller with ½" inlet and outlet ports designed to accommodate standard piping.

JABSCO

The pump-motor combination is used for general transfer applications in chemical, pharmaceutical, food and general industries. Capacity is 10 gpm. against a 10 foot head, and it is claimed suitable for use up to 20 psi. pressure. The unit weighs approximately 25 pounds. Jabsco Pump Co., 2031 N. Lincoln St., Burbank, Calif.

CADMIUM YELLOWS
Heat Stable

A series of Cadmium Lithopone Yellows in primrose, lemon and medium shades are claimed to be particularly adapted to heat resistant enamels, emulsion paints, leather finishes, tin printing inks, and plastic applications of all types, and, particularly advantageous where heat stability, alkali resistance and fastness to light are important. Kentucky Color & Chemical Co., 600 N. 34 St., Louisville 12, Ky.

For the **WIDEST**

RANGE of CONSISTENCIES

HORSE HEAD LEAD-FREE ZINC OXIDES

GRADES	*Raw Linseed (Acid No. 4)*	*Bodied Linseed (Acid No. 10)*	*Long Alkyds*
XX-2	MEDIUM	MEDIUM	MEDIUM
XX-55	MEDIUM	MEDIUM	MEDIUM
XX-50	MEDIUM LOW	MEDIUM LOW	MEDIUM LOW
XX-505	MEDIUM LOW	MEDIUM LOW	MEDIUM LOW
XX-601	MEDIUM LOW	MEDIUM LOW	MEDIUM LOW
XX-503	LOW	LOW	LOW

Because of the uniform high quality of these zinc oxides, consistencies follow these general patterns in various liquids unless unusual reactivity manifests itself.

WE SHALL BE GLAD TO ASSIST YOU—
in determining which Horse Head Zinc Oxide is best for you.

THE NEW JERSEY ZINC COMPANY
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now... A Complete Line of *Stir-in* colors

FOR EXTERIOR AND INTERIOR EMULSION PAINTS

Including chemical pigments, selected oxides, blacks and earth colors

These Aqueous Color Dispersions

Give you

WIDE COMPATIBILITY

All colors efficient in emulsions from PH 4.5 to 9.5

SUPERIOR MONEY VALUE

Improved tinting strength with easy mixing reduces labor and material costs.

UNIFORM PERFORMANCE

All colors pre-checked for compatibility in specific paints.

Our Technical Service Lab is at your service for the solution of matching problems. Check your requirements on coupon below and mail to us for immediate attention.

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AND CHEMICAL COMPANY, INC.
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Every day for 36 years the records have been taken at National Lead's Experimental Test Station, Sayville, L. I. . . . the weather, hour-by-hour . . . solar radiation . . . the chemistry of the air . . . the condition of thousands on thousands of paint samples. Today, on 2½ miles of test fence, more than 30,000 exposure tests are active.

FOOLPROOF

your exterior paints with Dutch Boy® "45X"

(Basic Silicate White Lead)

Want an extra leeway of safety against complaints? . . ."Use lead," say makers of exterior paints.

But thousands of exposure panels at Sayville, National Lead's Experimental Station go one step further. They *prove* you need lead for *uniform* performance. Prove, too, that "Dutch Boy" Basic Silicate White Lead "45X" *assures* uniform performance . . . makes exterior paints virtually foolproof, able to handle wide variations in application and service conditions.

In white House Paints, for instance, "45X" insures good self-cleaning. Preserves film integrity, as well.

In tinted House Paints, Dutch Boy "45X" increases film durability and maintains color uniformity.

In Primers, "45X" strengthens adhesion . . . helps keep the bond strong by resisting water.

Paint after paint, it's the same story . . . uniform performance . . . fewer complaints. With "45X," the time and cost of answering complaints goes down. Talk against your paints . . . talk you may not hear . . . fades away. Good will, repeat business comes your way.

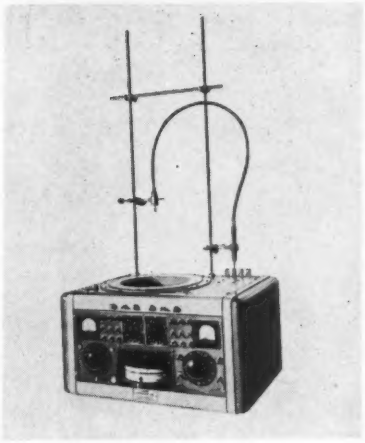
Cost is lower, too

You actually need fewer pounds of "45X." For in "45X" the reactive portion of each pigment particle is concentrated at the surface. Pound for pound, *more* lead is available than in other white leads.

No question about it. If you want to cut complaints, step up quality and save money, "Dutch Boy" Basic Silicate White Lead "45X" is the lead to use in exterior paints.

National Lead Company: New York 6; Atlanta; Buffalo 3; Chicago 80; Cincinnati 3; Cleveland 13; Dallas 2; Philadelphia 25; Pittsburgh 12; St. Louis 1; San Francisco 10; Boston 6 (National Lead Co. of Mass.). In Canada: Canadian Titanium Pigments Ltd., 630 Dorchester St., W., Montreal.

N E W
MATERIALS — EQUIPMENT



BURRELL

CASTOR PROCESS UNIT
Controls Dispersion

A multi-purpose castor process unit may be set up for a variety of controlled organic reactions including high polymer resin processing or polymerizations and distillations, according to the company.

Manufacturer claims the following features: Flexibility of the unit permits the processing of polyesters, phenolics, alkyds, silicones, etc., with a minimum of time or attention; process perimeters may be determined with sufficient accuracy for adoption in production units; interval timers will start unit before the operator arrives and shut off a process up to 20 hours after the operator leaves. Burrell Corp., 2223 Fifth Ave., Pittsburgh 19, Pa.

VINYL STABILIZER
For Plastisols

"Advastab X23-30," a liquid barium cadmium compound, is claimed to be an outstanding heat and light stabilizer suited for straight p.v.c. as well as copolymer resins. Company recommends it for all types of vinyl operations. Excellent clarity and long term heat stability is obtainable with product alone in formulations containing only DOP or other primary plasticizers, according to manufacturer.

In plastisols, the company recommends the use of three parts of product in a standard plastisol formulation of 100 parts resin, 60-80 parts DOP to give excellent heat stability and good clarity for 45 minutes at 380°F - 390°F. Advance Solvents & Chemical Corp., 245 Fifth Ave., New York 16, N. Y.

AEROSOL PAINT VALVE
Non-Clogging

Company says that this valve, by the very nature of its design, oviates the difficulty of clogging in the channels within the valve and between the cut-off and the external orifice, even if the material to be sprayed has a high solid content or an appreciable residue.

This is a needle valve with a needle projecting through the external orifice, wiping all residue from the orifice each time the valve is opened or closed, according to the company. It is claimed to positively and effectively spray any sprayable material, regardless of its solid content or the time interval between sprayings. The Engstrum Aerosol Valve Mfg. Corp., 3121 Ninth St. N., Arlington 1, Va.

ROTARY PAINT FILLER
In Portable Model

The Elgin high-speed six-valve rotary paint filler, now available in a portable model, occupies compact floor space of 62" x 46".

To make good paints better
more and more paint makers specify

THIXCIN®

The Multi-Purpose Additive

EFFECTIVE IN *so many* FORMULATIONS

Where	*Why*
GLOSS, SEMI-GLOSS AND FLAT ALKYD ENAMELS. FLAT WALL AND OIL BASE PAINTS	to eliminate sag, prevent pigment settling and flooding, improve brushability, control penetration, impart thixotropic body.
OUTSIDE HOUSE PAINTS	to aid pigment suspension, increase shelf stability, improve brushability.
SOLVENT TYPE RUBBER BASE PAINTS	for pigment suspension and color uniformity with low vehicle demand.
INDUSTRIAL PAINTS	to reduce flow and sagging, promote color uniformity and pigment suspension.
SHINGLE STAINS	to prevent running, pigment settling and uneven staining.
PASTE WOOD FILLERS	for controlled penetration, uniformity of color and pigment suspension.
CALKS AND PUTTIES	to impart shortness, prevent slumping, inhibit bleeding, improve "gunning."
PRINTING INKS	to give sharp definition of print, control flow, impart thixotropy.

• COSTS LESS BECAUSE YOU USE LESS •

Performance-proven by hundreds of paint manufacturers in over 2 years of volume use, THIXCIN is the ONE additive that does SO MUCH for SO MANY types of paint. Our Technical Service Department is available to help you use THIXCIN in your formulations.

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"Celanese Plastics Division Technical Service will help you formulate low-cost vinyl latex type paints and primers"

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No matter what type polyvinyl acetate resin you are now using or planning to use, Celanese is the producer to depend on—for speed of delivery, quality of product and expert technical assistance with your formulating.

Celanese is dependable!

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Celanese PVAc is the product of the Plastics Division—pioneer in paint and lacquer components. Technical Service Personnel are ready to get together with your chemists—to help you produce the best formulations for your purposes. Fill in and return coupon below for paint formulation information.

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Plastics Division, Box 165-L
290 Ferry Street, Newark 5, N. J.

Celanese Corporation of America, Plastics Division,
Box 165-L 290 Ferry Street, Newark 5, N. J.

Please send me:

- ☐ Bulletin NP-12 on CL-100 for paints
- ☐ Sample Celanese PVAc Homopolymer CL-100
- ☐ Bulletin NP-14 on CL-202 for paints
- ☐ Sample Celanese PVAc Copolymer CL-202

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TITLE_____ COMPANY_____

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PLASTICS and RESINS

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Newest
of the
HELIOGEN®
TONERS

Heliogen Blue BNF

—non-flocculating
—non-crystallizing

Non-bleeding in alcohol—outstandingly stable on aging in most lacquers and alkyd enamels—these are the advantages offered by Heliogen Blue BNF Powder and Presscake.

The improved Heliogen Blue BNF Powder is recommended for its ease of grinding—the presscake for flushing operations to produce the brilliant shade and high tinting value characteristic of phthalocyanine pigments.

Heliogen Blues and Greens are now available in various forms of powders and presscakes for printing inks, paints, lacquers and enamels. (The inks by which this page was printed were made with Heliogen Colors.)

To meet your particular requirements as to fastness, tinctorial shade, method and ease of application, let us send you our free specifications booklet on Heliogen Colors — or call on the services of our Technical Department. Please address your inquiry to Department 31.

gdc gaf GENERAL DYESTUFF COMPANY

SELL ALL SIZES

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✓ **SMALLER SIZES**
for TOUCH-UP
Market

✓ **MEDIUM SIZES**
for
DO-IT-YOURSELF
Market

✓ **LARGER SIZES**
for
PROFESSIONAL
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Market

Also Available: special interior coatings for rubber-base paints; "Bail Guide" ears.

You're missing sales if you don't market a family of products in different sizes.

First, choose from Crown's complete line of "Double Tite" containers to give your products utmost protection.

Then call on Crown's creative Art and Design Service for modern, related labels to power your products with "sell."

This has paid big dividends for others . . . why don't *you* cash in? It's as easy as calling in a Crown Sales Representative.

Use These Other E-x-p-a-n-d-e-d Crown Services
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"Big Enough to Serve You . . . Small Enough to Know You"

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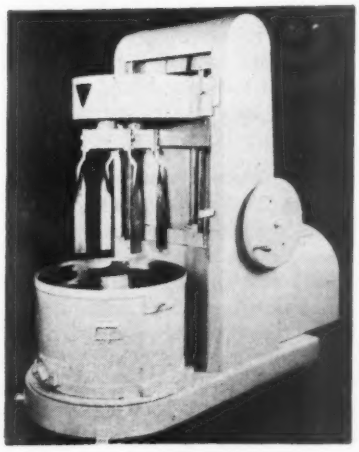
NEW MATERIALS — EQUIPMENT

High speed, accurate deliveries in sizes from 1/32 gallon to 1 gallon with a rapid output of from 80-100 pints per minute to 25-35 gallons per minute are said to have been established. Other features include quick removal of valves and pistons for easiest cleaning, specially designed discharge valves to prevent drip, variable speed drive and no-can no-fill. Gordon Best Co., Inc., 228 N. La Salle St., Chicago 1, Ill.



HILDEBRAND

CHANGE CAN MIXER
Has "Floating" Scraper

Change can mixer, utilizing a patented "floating" scraper which forces material from the inside edge of the can into the mixing area, is said to be suitable for the paint, ink and chemicals fields.

Double paddle mixing is said to provide a faster, more thorough mixing action, through a planetary type motion. The agitator blades extend to the bottom of the can, force required per production run, and less severe grinding are the advantages of the new mixer, according to the manufacturer. Mixer is available in two models: Vertical raising and tilting head types. The units are made in sizes from 8 to 150 gallons capacity. Cincinnati Hildebrand Co., Inc., Cincinnati, Ohio.

RED PIGMENT
Cadmium-Murcury Type

Company has announced the launching of its "Mercadium" reds to industry at large. The name is intended to indicate a combination of the sulfides of cadmium and mercury which, the company says, is more economical than the cadmium sulfo-selenide reds they will replace.

Company says product offers equal performance along with improved brilliancy and cleanliness of hue. These reds are said to be insoluble in the processing media of industry, heat resistant at elevated temperatures, and extremely fast to alkali and the deteriorating effects of exposure to sunlight and the elements. Company is now producing a light and dark red and is planning intermediate and maroon shades to a total of six in all. Imperial Paper and Color Corp., Pigment Color Div., Glen Falls, N.Y.

SILICONE RESINS
Two Types

Silicone Resin "SR-112" has been designed specifically for use as a vehicle for high heat and weather resistant coatings. The resin is said to combine outstanding heat resistance with an unusual balance of flexibility, hardness and curing speed.

Aluminum finishes based on this resin are claimed to exhibit superior performance in weathering and atmospheric corrosion resistance at temperatures up to and in-

Monsanto delivers fast from all three points!

Whatever your needs . . . melamine, urea or phenolic resins and latices for paints, varnishes, lacquers . . . Lytron* synthetic polyelectrolyte thickeners for paint and rubber products . . . Monsanto supplies a large and diversified group from three strategically located delivery points. For technical bulletins and free experimental samples, write on your letterhead to Monsanto Chemical Company, Plastics Division, Dept. PV12 Springfield 2, Massachusetts.

MONSANTO

*Lytron: Reg. U.S. Pat. Off.

cluding the 1000 F range. Colored enamel finishes, based on this resin are said to have shown outstanding color and gloss retention and film integrity after many weeks of nearly continuous exposure at 500 F (periodically cooled for very short intervals for inspection).

Product is said to compatible with many types of organic resins and may be blended or reacted with them to yield modified silicone finishes.

Silicone Resin "81572" is said to be an entirely new type of silicone organic copolymer. Company says product represents a revolutionary development in the field of color retentive paint vehicles and possesses outstanding color and gloss retention at temperatures up to 440 F. Properly cured films are claimed to have hardness and mar resistance, flexibility, impact resistance, and chemical resistance. This resin is said to be compatible with most low to medium viscosity and melamine formaldehyde resins and has limited compatibility with certain alkyds. General Electric, Silicone Products Dept., Waterford, N.Y.

CALCIUM SILICATES
Pigment Extender

A line of synthetic calcium silicates, called "Micro-Cel," is produced by the chemical combination of lime and diatomaceous silica.

Manufacturer claims the following features for "Micro-Cel": Viscosity Control—various degrees of viscosity up to a paste or semi-solid can be achieved by adding relatively small quantities of product; Anti-caking Agent—Product's high absorption and fine particle size of less than 0.1 micron effectively controls caking of deliquescent products and assures flowability even after prolonged storage; Bulking Agent—A small percentage of product materially increases the bulk of dry powders; allows control of package density; Pigment Extender—Product's surface characteristics, fine particle size and large specific surface combined with inertness indicates its value as a pigment extender.

Other features claimed include: Suspension Agent—Product's different combination of properties provide aid in suspension of heavier solids; Flatting Agent—Product's high absorption, fineness and particle shape indicate its value; and Reinforcing Pigment—Combination of fine particle size, particle shape and wetting characteristics suggest product's value as a reinforcing pigment. Johns-Manville, 22 E. 40 St., New York 16, N. Y.

VISCOMETER
Wide Range

Company announces a high-speed, wide-range instrument for determining the viscosity, yield value and thixotropic break-down of highly viscous materials.

Plastic viscosities in the range of 1 to 2500 poises, and yield values up to 180,000 dynes/cm² may be determined with the "Rotational Viscometer," according to manufacturer. Viscosity measurements are determined by consistency curves, rather than the single-point method of the conventional viscometer. Variable-speed cup rotation—from 10 to 400 rpm, in steps of 10 rpm—permits up to forty speed changes within three minutes, providing quick, easy plotting of the curve, according to the company. Precision Scientific Co., 3737 W. Cortland St., Chicago 39, Ill.

Chats about Finishes

FLAME-RETARDANT PAINT
ADDS COLOR TO THE NAVY

by REED COMBS,
Hercules Powder Company

"Now hear this . . . Breakfast will be served at 0600 in the sunglow room."

Such an announcement over the public address system of a Navy carrier sounds far-fetched, but it's no longer impossible. Today the Navy is using nine pastel colors for the interior painting of its vessels, including such shades as beach sand, rosewood, and sunglow. This is one facet of the Navy "Habitability Program."

Of course, any paint that meets Navy specifications had to have more than color. The paint had to have color permanence, resistance to soil, ease of cleaning, and no tendency to become sticky under pressure of sweaty hands. It also had to fulfill such requirements as being stable enough to stand long storage periods, ability to go over old paint and standard primers, and on top of everything else, it had to be fire-retardant!

The search for such a paint began in 1948, when the Navy experimented with colors in the interior of a submarine. Various trial formulations were applied to test panels on the "sub" but only two survived. One was a baked-on enamel, impractical for Navy maintenance programs; the other, an air-drying alkyd finish based on Hercules Parlon® (chlorinated rubber).

In meeting the Navy's requirements, the Parlon-based formulation added another case history to many such examples of where Parlon has been helping to solve exceptionally difficult protective coatings problems. We will be glad to discuss with you the ways a Parlon formulation may solve one of your own problems.

Cellulose Products Department
HERCULES POWDER COMPANY
INCORPORATED
926 Market St., Wilmington 99, Del.

IC55-5

NEWS

Plant Capacity Increase

Ground was broken in Akron, Ohio recently in preparation for construction work on a $3,500,000 capacity increase to the Chemigum plant of the Goodyear Tire and Rubber Company's chemical division.

The plant, part of the company's recently announced $100,000,000 expansion program, will produce Chemigum rubbers and latices used by the paper, paint, textile and rubber industries.

•

To Centralize Operations

Fred'k A. Stresen-Reuter, Inc., midwestern suppliers of raw materials to the paint and printing ink industries, is building a one story laboratory, office and warehouse adjacent to the company's plant at Bensenville, Ill.

When the new building is completed, main offices will be moved to Bensenville from the company's present location in Chicago, where all company activities will be integrated under one roof.

•

Plant Maintenance Show

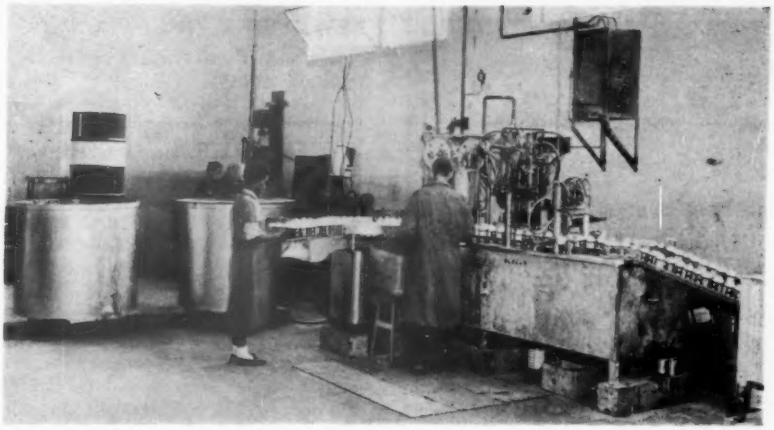
A group of 45 experts, drawn from all types of industries, will lead the discussions at the 7th Plant Maintenance & Engineering Conference which opens in Convention Hall, Philadelphia, Jan. 23.

The conference will extend for three days, while the Plant Maintenance & Engineering Show will run for an additional day. Clapp & Poliak, Inc., New York exposition management firm, produces both events.

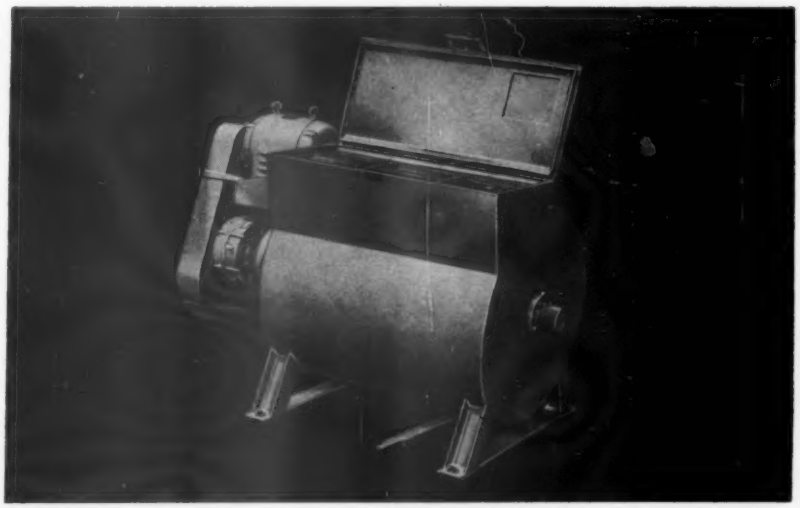
•

Reichold Canadian Site

Reichhold Chemicals (Canada) Ltd. has purchased a 112 acre site for a possible new plant in Canada, according to an announcement from the company. It is situated at Millhaven, Ontario, near Kingston, on the St. Louis Waterway, especially convenient to ample transportation facilities and a plentiful water supply from Lake Ontario.



AUTOMATION PACKAGING: Plasti-Kote, Inc., Cleveland, Ohio recently opened its new $350,000 plant, considered one of the most modern in the aerosol industry. The facility, which features many new examples of automation in the production of spray paints and specialty items, is expected to hit new production heights for industrial packaged items, according to the company.



Why this Hockmeyer Horizontal Paste Mixer brings you

3 IMPORTANT ADVANTAGES

1. Faster mixing
2. Greater efficiency
3. Easier cleaning

The Hockmeyer Horizontal Paste Mixer's 3 sets of mixing blades are specially designed, precision built. They eliminate "dead spots" and material build-up on tank sides. Their double rolling action agitates the batch into a homogenous mass in the shortest possible time. The unit is excellent for lead pastes, wood fillers, caulking compounds, color dispersions and other heavy, non-flowing materials. Its greater mixing efficiency provides a bonus in the form of lower horsepower requirements.

One of the Hockmeyer Horizontal Paste Mixer's most important advantages is that it is self-unloading. Its unusual mixing action pushes out even viscous, non-flowing materials; the bottom center gate outlet controls the rate of flow.

Cleaning this mixer is easy. Just place a solvent in the machine and start the motor.

The Hockmeyer Horizontal Paste Mixer is *safe* to use, too. All external moving parts are covered with a steel guard. A removable steel grating over the top opening prevents anything falling in and being caught in the blades.

The Hockmeyer Horizontal Paste Mixer is a valuable unit on both continuous and changing batch operations. Write today for free technical data sheet.

3 sets of blades touch every area of tank during mixing action!

H HERMAN HOCKMEYER & CO.
341 COSTER ST., NEW YORK 59, N. Y.

Herman Hockmeyer and Company PVP-125
341 Coster St., New York 59, N. Y.

GENTLEMEN: Please send me your free, illustrated technical data sheet describing the Hockmeyer Horizontal Paste Mixer

My name _____

Company _____

Address _____

City _____ Zone ____ State ____

PERSONNEL CHANGES

HILTON-DAVIS

George F. Martin has been appointed assistant to Nelson S. Knaggs, vice-president in charge of sales. The move was made as part of the chemical manufacturer's expansion program.

Martin has been associated with the company for the last 18 years. Since 1951 he has been manager of sales to the printing ink industry for the company's mid-west division.

NEW JERSEY ZINC

Clyde A. Berger, pigment sales representative in the Cleveland district for the past 20 years, has been transferred to the technical service division, with headquarters in New York.

C. A. Berger

In his new position, he will concern himself primarily with the application of the company's pigments in the paint industry.

Prior to his appointment as sales representative, Mr. Berger was employed for several years in the research department.

CARBIDE and CARBON

Gordon Ault has been appointed assistant district manager of the San Francisco district, it was announced by E. E. Fogle, vice president. He has been a technical representative in the San Francisco and Los Angeles districts since 1946.

D. R. Beasley has been transferred from the plant at Institute, West Virginia to the fine chemicals sales group to work on the market development of coal chemicals.

Mrs. Mary Anna Bresnahan has joined the fine chemicals sales group to work on industry studies and to assist with various market development programs.

J. D. Mueller, after training at Boyce Thompson Institute for Plant Research, will be assigned to the sales group for Crag agricultural chemicals.

Arvid Teleki has joined the market research department to work on industrial economic research.

The following assignments of technical representatives have also been made recently: **A. P. Chavent** to the Cincinnati district, **A. A. Douglas** to the Charlotte district, **W. P. Emerson** to the Atlanta district, **J. F. Flynn** to the Boston District, **J. T. Fox** to the New Orleans district, **R. F. Gildehaus, Jr.** to the Philadelphia district, **D. P. Shannon** to the Kansas City district, **B. H. Wilder** to the Detroit district, and **R. W. Wittmus** to the Indianapolis district.

CALIFORNIA INK

Richard P. Weber has joined the staff in San Francisco, according to C. D. Leigh, manager of the paint raw materials department. He will concentrate on technical assistance to paint manufacturers with special emphasis on formulations of industrial finishes. Mr. Weber is a past president of the Golden Gate Paint and Varnish Club. Since 1950, he has been a chemist for the W. P. Fuller Co.

BENJAMIN MOORE

B. M. Belcher was elected chairman of the board at the recent annual meeting of the board in Toronto, Canada. These other executive and administrative changes were announced:

J. P. O'Neill and **N. F. Ward** elected vice presidents; **H. C. Pope** elected secretary-treasurer; **W. J. Cinnater** and **H. F. Penney** elected to the board of directors; appointment of **J. P. Dupuy** to branch manager and sales manager, **Rolland Laverdiere** to assistant sales manager and **Paul Bodson** to cashier of the Montreal branch; appointment of **M. V. Tait** to assistant sales manager and **William Baggs** to advertising manager of the Toronto branch.

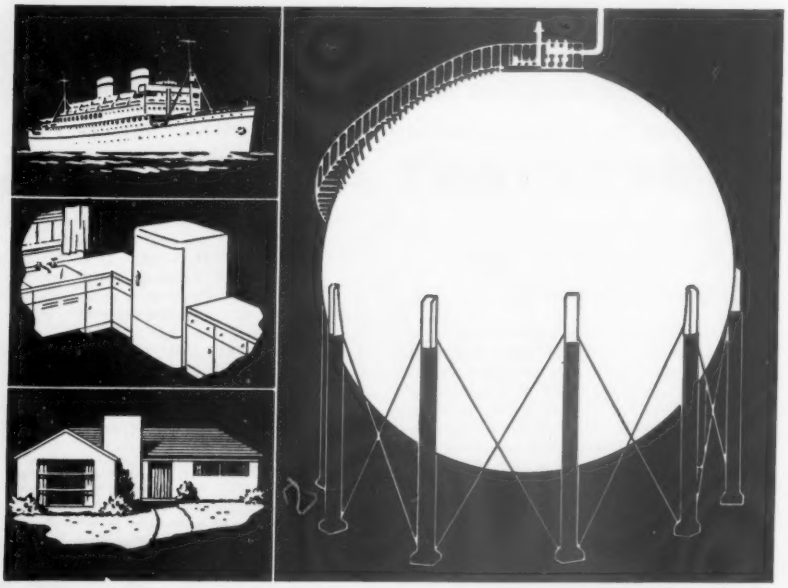
For bright, durable finishes— use

Ti-Pure®

(TITANIUM DIOXIDE PIGMENTS)

TI-PURE is Du Pont's registered trade-mark for its titanium dioxide pigments—the purest, whitest pigments made today.

Available in rutile and anatase grades, these time-proven pigments give your paints the full range of properties needed for lasting whiteness and excellent over-all performance.



For help in selecting the right "Ti-Pure" pigment for your paints, call your Du Pont representative or write: E. I. du Pont de Nemours & Co. (Inc.), Pigments Department, Wilmington 98, Delaware.

DU PONT

REG. U. S. PAT. OFF

BETTER THINGS FOR BETTER LIVING

.. THROUGH CHEMISTRY

DOW CHEMICAL

Floyd J. Gunn has been named manager of the Los Angeles office, it has been announced by Donald Williams, vice president and director of sales. Gunn has served as manager of coatings sales for the plastics department for the past six years. He succeeds **Homer L. White** who has held the post since 1950 and will now take over an assignment on the production control staff in Midland.

F. J. Gunn

Gunn came to the company in 1939, was a member of the Chicago office staff from 1945 to 1949, and head of coatings sales since 1949, with headquarters in Midland.

AMERICAN LECITHIN

Roy T. Cucullu, New Orleans, will handle the sale of "Alcolec" lecithin products in the territory comprising Louisiana, Mississippi and eastern Texas. He will also handle special "Alcolec" lecithin for emulsion paints for low odor alkyds.

RHEEM MANUFACTURING

G. M. Greenwood and **Gordon Mallatratt,** both vice presidents, received new management assignments, according to R. S. Rheem, president.

Greenwood becomes chief financial officer, and Mallatratt, succeeding him, becomes secretary and treasurer of the corporation. He has been general manager of the Rheem Products Division.

Vearl J. Heinis, general sales manager of the division, succeeds Malatratt as general manager of the Rheem Products Division.

Angus Lightfoot-Walker, vice president in charge of Rheem International, has become a director of Rheem Manufacturing Co., Walker joined Rheem Australia as sales manager in 1937. He became general manager before transferring to New York as executive assistant to the president. In 1951 he became vice president in charge of Rheem International, which handles the company's overseas investments and sales.

McCLOSKY VARNISH

Willis H. Kirby and **Philip McIntosh** have been appointed trade sales representatives. Kirby, located at Catonsville, Md., will cover the Washington, D. C., and Maryland territory. McIntosh, with headquarters at Nashville, Tenn., will cover Tennessee and southern Kentucky.

FREEMAN CHEMICAL

R. A. Swain has been named director of alkyd resins. He has spent the past 25 years in research, production and administrative activities in the paint and chemical industry.

He was general manager of the American-Marietta plant at Kankakee, Ill. before he resigned to join Freeman at Saukville, Wis.

PENNSYLVANIA COLOR

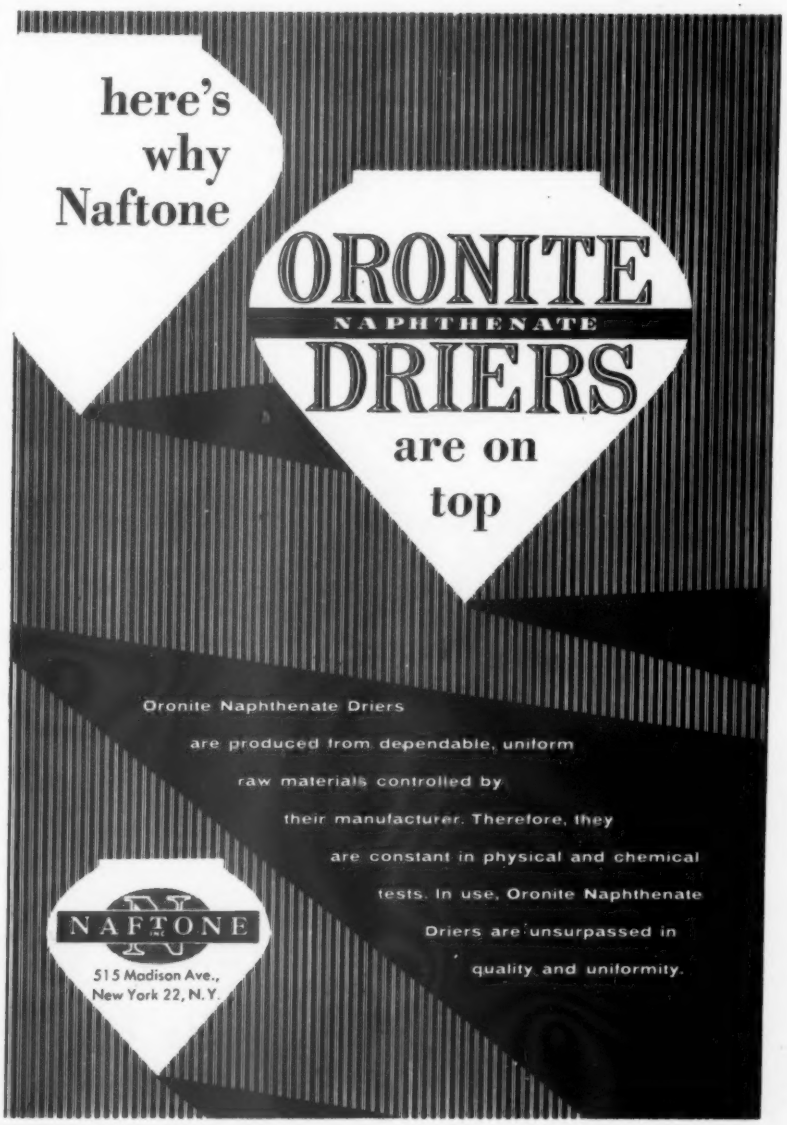
L. I. Weinrich has been appointed technical director in charge of research, development and control of pigment dispersions for protective coatings, printing ink and plastic manufacturers. He was formerly employed as a development chemist by the pigment division of American Cyanamid Co.

C. N. Neunhoffer

W. A. Morton

DEWEY and ALMY

Charles N. Neunhoffer has been assigned territory in the central midwestern states, and **William A. Morton** will operate out of the southern states in sales of polyvinyl acetate, plasticizers and dispersing agents, according to Charles E. Brookes, organic chemicals sales manager.


here's why Naftone
ORONITE
NAPHTHENATE
DRIERS
are on top
Oronite Naphthenate Driers are produced from dependable, uniform raw materials controlled by their manufacturer. Therefore, they are constant in physical and chemical tests. In use, Oronite Naphthenate Driers are unsurpassed in quality and uniformity.
NAFTONE INC.
515 Madison Ave., New York 22, N.Y.

KINETIC DISPERSIONS

L. S. "Jack" Behrns has been elected vice president of the corporation, it was announced by Charles E. Kew, president. He was formerly assistant sales manager. Mr. Behrns will continue to maintain his office in Buffalo, N. Y.

L. S. Behrns

The company manufactures the "Kady" Mill which is said to provide users with cleaner color, higher gloss, and a drop in labor cost per gallon in a wide variety of materials. Company headquarters is in Buffalo, N. Y.

MICHIGAN CHEMICAL

Dr. Dwight Williams has been named director of research.

Dr. Williams, who resigned as Chief, Biology and Chemical Branch, Quartermaster Research and Development Command, United States Army, Natick, Mass., will be located at the company's research and technical laboratories at Saint Louis, Michigan.

MARTIN-SENOUR

Nelson H. "Mike" Mapes has been appointed Texas territorial manager for the automotive division, it was announced by William M. Stuart, president. He will operate out of National Automotive Parts warehouses in Abilene, Dallas, Houston, and San Antonio.

AMERICAN MINERAL SPIRITS

John E. Capizzano has been elected assistant vice president, according to an announcement from the board of directors.

J. E. Capizzano

He joined the company in 1934 at the testing laboratory at Carteret, N. J. and later became director of the laboratory. Following World War II he was moved to eastern sales headquarters in New York as a technical sales representative for industrial naphthas and solvents. Later he was named operations manager for the sales department.

In August, 1954 he was promoted to eastern sales manager, responsible for the complete line of petroleum solvents.

BARRETT DIVISION

C. G. Stupp, vice president, has announced three managerial appointments in the research and development department.

Dr. Maurice H. Bigelow, formerly director of the Glendale Plaskon Laboratory in Toledo, Ohio, has been appointed to the newly created position of director of research. In addition to directing the division's research, he will be head of the Glenolden, Pa., Laboratory, at which he will be located.

Dr. Bigelow is author of more than 50 technical articles, books and patents, primarily on plastics, and is a member of numerous professional and technical societies.

David E. Cordier has been appointed director of the Glendale Plaskon Laboratory, at which he was previously supervisor of research. More than a score of patents have been granted him as a result of his original research.

James B. Maguire has been appointed director of development. In this newly created position he will manage engineering development, process design, and pilot plants, with headquarters in Frankford, Philadelphia, Pa. For the past three years he was Director of the Glenolden, Pa., Research Laboratory.

AMERICAN CAN

T. E. Alwyn, who had been a vice president in the executive department, has been appointed vice president in charge of operations in the Atlantic division, according to William C. Stolk, president.

With the company for 31 years, Mr. Alwyn was elected vice president in charge of sales in 1951, and two years later vice president in the executive department.

Time Flies in ATLAS Weather-Ometers

In developing new paint products—the new Atlas Weather-Ometer Model DMC will give accurate dependable forecasts of the weathering durability and color fastness of the product. Test programs can be exactly duplicated at any time to give accurate comparative data of various formulas.

For quality control in production — the Weather-Ometer is useful in maintaining the quality standard of the product, by checking each batch run for any deviation from the established weathering and light fastness standards.

Accuracy in test results is greatly increased in the DMC Weather-Ometer by a positive control of specimen temperatures. Automatic humidity control up to dew point is available as optional equipment.

Both horizontal and vertical testing is available. Shallow containers are used for semi-liquid material and vertical panels for solids.

All automatic controls including complete voltage controls are located on the front panel above the test chamber door. Source of light is two Atlas enclosed violet carbon arcs.

Write for complete Weather-Ometer® catalog.

ATLAS ELECTRIC DEVICES CO.

4114 N. Ravenswood Ave., Chicago 13, Illinois U. S. A.

Sales representatives in principal cities throughout the world.

If *the* perfect outside white paint is ever found, chances are it will be found here at the Titanium Pigment Corporation's Testing Station, Sayville, Long Island.

First, last, and always this station is devoted to paint improvement. First of its kind to test titanium pigmented paints . . . it's the last word in modernity. And it tests paint in all ways. 30,000 paint panels on the 20-acre tract take a beating from all kinds of weather. All types of formulations are applied to all kinds of surfaces . . . woods, metals, masonry, etc. The results of these tests help us to help you make long-lasting, whiter whites . . . help keep you in the black.

Consult our Technical Service Department with your problems in outside paints. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; Atlanta 2; Boston 6; Chicago 3; Cleveland 15; Houston 2; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 14, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments Limited, Montreal 2; Toronto 1.

TITANOX®

the brightest name in pigments

TITANIUM PIGMENT CORPORATION

Subsidiary of NATIONAL LEAD COMPANY

GLIDDEN

Wendell S. Junkin has been appointed manager of the new Harrisburg branch operation.

The branch was established after the recent purchase of assets of The Protective Paint Co., former distributor for Glidden paint products in the area.

Mr. Junkin has been with the company since 1941.

Fred L. Fuller has been named manager of the Rochester branch operation.

Formerly central region maintenance sales manager, Mr. Fuller has been with the firm since 1952.

Two executive appointments to the staff of the color laboratory and color studio were also announced.

Carl Zibell, a major contributor in recent years to the company's progress in color development, has been named manager of the laboratory, and **Robert P. Morris** has been appointed manager of the studio and will supervise activities with particular attention to the execution of plans for large maintenance and new construction jobs.

All announcements were made by A. D. Duncan, vice president and general manager of the paint division.

SHERWIN-WILLIAMS

J. P. Patterson has been named area sales manager for southern Michigan, according to W. M. Remy, north central regional director. He has been painter-maintenance sales manager for the company at Cleveland headquarters.

That's all it costs to remove the odor from your paint with Maskit #2

- Makes your paint more acceptable to painters *and* home owners.
- Masks the odor in the can and while paint is being applied . . . as well as during – and after – the drying period.
- Does not affect drying time or color durability.
- Amazingly economical . . . use 1 lb. of Maskit #2 to 150 gallons of paint.

MASKIT #2 is equally effective in paints, lacquer thinners, varnishes and other similar types of products. Order a trial pound today!

$1.50 lb.

AROMATIC PRODUCTS, INCORPORATED
15 EAST 30th STREET, NEW YORK 16
CHICAGO • DALLAS • MEMPHIS • PITTSBURGH • LOS ANGELES • BOSTON

W. W. Peacock

D. J. Stark

UNITED GAS

Walter W. Peacock, Jr. has been named sales manager of the polyvinychloride division, and **D. J. Stark,** plant manager of Escambia Bay Chemical Corp., which will build a multimillion dollar plant for the manufacture of raw materials for the plastics industry at Pensacola, Fla., the site of its large petrochemical plant which is nearing completion.

Peacock formerly was assistant sales manager for Marvinol of the Naugatuck Chemical Division, U. S. Rubber Co., and technical representative in the New York metropolitan area for Stanley Chemical Co. of East Berlin, Conn.

Stark was manager of the National Petrochemicals Corp. plant at Tuscola, Ill., and chief technologist and department manager in charge of catalytic cracking for Shell Oil Co. at its Montreal plant before joining Escambia Bay.

AMERICAN CYANAMID

R. A. Hoekelman, general manager of the plastics and resins division, has announced the following appointments:

G. W. Larson has been named supervisor of plastics promotion. For the past eight years, he has served as manager of technical service for the Jefferson Chemical Co., a Cyanamid subsidiary.

E. V. Michal has been appointed supervisor of thermosetting products. He has been with the company since 1936.

Joseph Grabowski has been named supervisor of thermoplastic products. For the past nine years, he has been technical service representative for molding compounds in upper New York State and western Pennsylvania.

Arthur Nufer has been appointed senior technical sales representative for thermoplastic compounds. For the past two years, he has been in charge of production engineering at the Tech-Art Plastics Co., Morristown, N. J.

UNIVERSAL PAINT

Robert R. Sanker has joined the sales and service staff. For the past six years he represented the DeVilbiss Co., and was its Cleveland branch manager for the past three.

Preview of PERMAGEL Properties
Prime advantage of Permagel is its needle-like particle shape, which approaches colloid chemistry's ideal for forming controlled gel structures.
Excellent suspending properties. (Left) TiO2 suspension in water with Permagel as suspending agent. (Right) Same mixture without Permagel.
WITH HEAT-STABLE PERMAGEL THICKENING AGENT
WITH NON-HEAT-STABLE ORDINARY THICKENING AGENT
70 F
110 F

PERMAGEL®

...new highly effective agent for thickening, gelling, imparting thixotropic body

Remarkable Properties, Low In Cost—Permagel is an entirely inorganic purified colloidal form of attapulgite which provides a striking combination of properties for application in the paint industry. It is highly effective as an emulsifier, emulsion stabilizer, heat-stable thixotropic thickener, and suspending agent for pigments. It prevents sagging, aids brushability, eliminates ropiness.

One Thickener For Both Systems—Flexible in operation, Permagel is efficient as a thickening or gelling agent for imparting thixotropic body to both aqueous and organic systems.

Merits Investigation—Check your needs on the coupon. M&C's paint specialists at Minerals Research Center will be pleased to work with you.

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Please send me:
☐ Complete, up-to-date technical literature
☐ A generous sample of Permagel for evaluation as

_____
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name _____ title _____
company _____
address _____
city _____ zone _____ state _____

NATIONAL LEAD

James W. Bowen has been appointed manager of sales promotion for the Pacific Coast branch and **Frank M. O'Connor** becomes sales manager of the branch's Southern division.

After nearly twenty-five years of service to the company in the Southern California area, Bowen will transfer his business headquarters to San Francisco where he will supervise promotional activities for the eleven Western states.

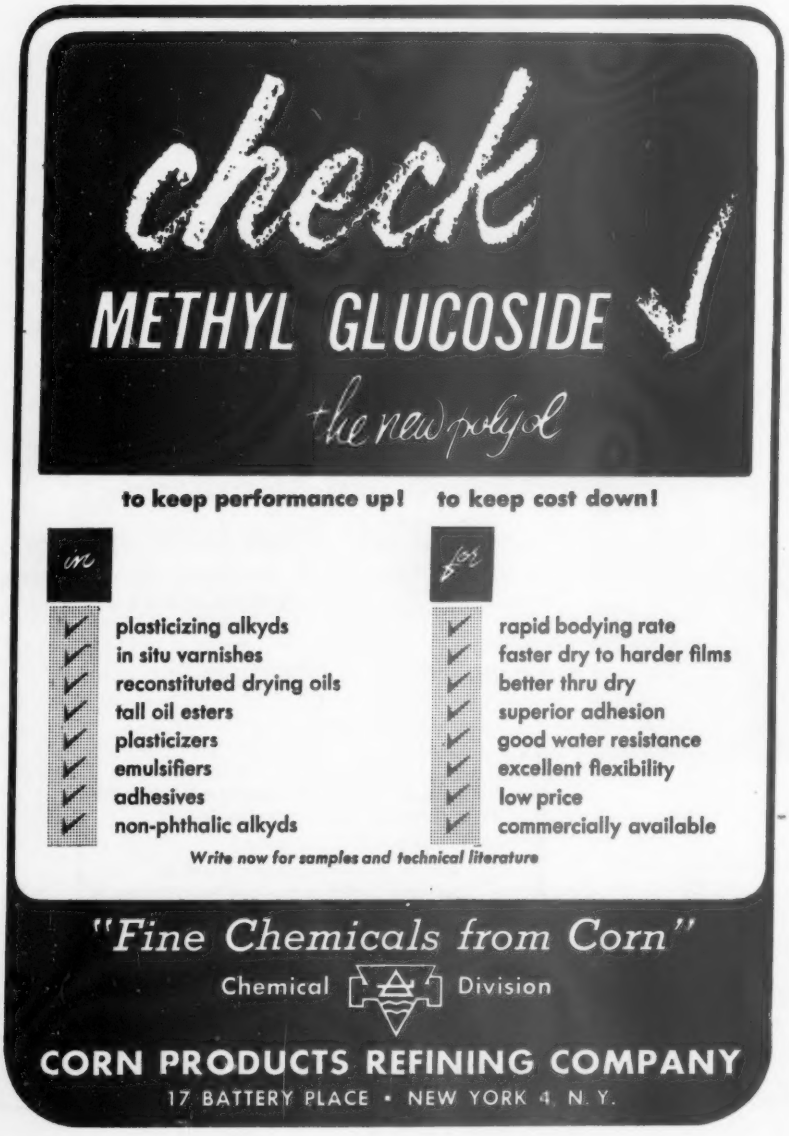
Frank M. O'Connor, named as Mr. Bowen's successor in the post of southern division sales manager started with the company in 1939.

Norman L. Cooperman has been named to head up technical service in the sale of plasticizers and stabilizers for the vinyl resin industry.

DOW CORNING

Olin D. Blessing, sales manager, has been made a vice president of the company, it was announced by Dr. W. R. Collings, president.

When Dow Corning began doing business in February, 1943, Mr. Blessing was its first full-time employee, Dr. Collings said. At that time, he had a two man sales department, a handful of laboratory curiosities to sell, and one important customer, the U. S. Government. Starting with these, he ran the sales volume up from its war-time first year of $1,000,000 to a peacetime annual volume of over $25,000,000. To do this, he built a sales organization of over 100 technically trained men selling over 200 commercial silicone products to thousands of customers in every major industrial market.



HERCULES POWDER

Wilbur E. Becker has been appointed plant manager of the tall oil plant at Franklin, Va. He succeeds **Spencer H. Hellekson** who has been transferred to Wilmington as assistant director of operations of the department.

Dennis L. Molnar has been named assistant plant manager at Franklin; **Winford J. Janes, Jr.,** plant engineer; and **John B. Moniz,** chief chemist. The appointments were announced by Carl M. Linden, director of operations of the paper makers chemical department.

An organizational realignment resulting in new assignments in the synthetics department sales division has been announced by James W. L. Monkman, the department's director of sales. The new assignments are: **John F. Copeland,** field sales manager; **George E. Osburn,** sales manager, Wilmington district; **John S. Autenrieth,** industry sales manager, covering the adhesives, printing ink, petroleum, and plastics industries; **J. G. Little,** industry sales manager, covering paint, varnish, lacquer, and other industries; **Henry D. Heiser,** sales manager, Houston district; **B. J. Dougherty,** sales manager, St. Louis district; and **Cliff S. Skow,** resident technical representative, Los Angeles district.

Roland S. Sawdey has been appointed manager of the Detroit sales district, for the cellulose products department. He succeeds Emmett E. Hixon, who has been named manager of plastics sales for the department.

GODFREY L. CABOT

Lee Cisneros has been promoted to general traffic manager, with headquarters in Boston, according to an announcement from J. Boyd Britton, operations vice president.

Formerly associated with Cabot Carbon Co. at Pampa, Texas, a subsidiary, Cisneros was transferred to Boston as assistant traffic manager in 1950. In 1952 he became traffic manager. In his new position he will assume further administrative responsibilities.

DU PONT

Donald V. Bauder has been appointed manager of trade sales of the finishes division, succeeding **Samuel L. McSorley** who has been assigned to the director of sales staff to implement important sales studies and analyses.

Bauder, who has been assistant manager of trade sales since 1952, joined the company in 1925. McSorley, with the company since 1916, has been manager of trade sales since 1942.

another major source of supply

GLYCERINE

(Dow's New Synthetic Now Here)

High quality pure synthetic glycerine — now in local storage for your needs. Dow's synthetic glycerine is unsurpassed as a solvent, humectant, stabilizer and alkyd base. Order the quantity you need and your order will be in your plant within 24-hours in most cases.

Glycerine is another major product available from your best source of supply — your nearby Solvents and Chemicals bulk plant. For a complete product and price list and samples, call or write today.

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Aliphatic Petroleum Naphthas
Alcohols and Acetates
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Aromatic Solvents, Petroleum and Coal Tar
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Dowanols and Glycerine
Glycols and Glycol Ethers
Ketones and Ethers
Oils and Fatty Acids
Plasticizers
Resinates—Sodium and Potassium
Rosins—Gum and Wood
Stearates
Terpene Solvents
Waxes

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HERCULES POWDER

Dr. Robert W. Cairns, assistant director of the research department since 1945, has been appointed director of research. He succeeds **Dr. Emil Ott** who resigned to join Food Machinery and Chemical Corp.

Dr. Cairns, who served in 1953 on leave of absence from Hercules for one year as deputy assistant secretary of defense for research and development, joined the company as a research chemist in 1934 at the Experiment Station near Wilmington. In 1940, he was named assistant to the director of research, and the following year he was named director of the Station.

When the company's Research Planning Committee was organized about two years ago by President A. E. Forster, Dr. Cairns was chosen to be chairman of a group which included the company's president, members of the board of directors, the director of research, and executives from each of the six major operating divisions.

During the war period he also headed the Development Department of the Hercules-operated Radford Ordnance Works, Radford, Va. In 1942, Dr. Cairns went to England for the Army Ordnance Department to study developments in rocket propellants, and returned to work out production techniques for the ordnance plants in this country.

Dr. Ott joined Hercules in 1933 as a member of the Development Department in Wilmington. He was named head of the Research Department at the Experiment Station in 1937, and has been director of research since 1939.

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O'BRIEN PAINTS

Robert K. Tucker has been appointed industrial sales manager, it was announced by Jerome J. Crowley, Jr., president.

He will be responsible for the complete industrial sales program which is centered in Indiana, Michigan, Ohio and Illinois. Mr. Tucker was formerly St. Louis district sales manager of the Wyandotte Chemicals Corp.

BARRETT DIVISION

Ralph W. Burdeshaw has been named southern district manager of industrial resins sales. He will be responsible for sales for all Plaskon industrial resins products, including, in addition to Plaskon polyester resins: Abrasive binders; glues and adhesives; paper treating, laminating, phenolic and foundry resins; and others of the industrial resins group products.

Mr. Burdeshaw was a former sales representative for adhesives division of Libbey-Owens-Ford Glass Co. before being placed in charge of marketing glass reinforced corrugated polyester sheeting in 1953.

UNITED STATES RUBBER

Kenneth H. Barratt has been appointed a sales representative in the latex and lotol department of the Naugatuck Chemical division, it has been announced by Albert W. Holmberg, sales manager.

Mr. Barratt, who has been with Naugatuck Chemical since 1951, will make his headquarters in Boston. Before his appointment to the sales staff, he was a supervisor in the synthetic rubber control laboratory and also a sales trainee.

GENERAL ELECTRIC

J. L. Galt, plant manager at Pittsfield, Mass., has announced the following appointments in the phenolics products section:

James F. Whitney was named superintendent of the phenolic products plant; **Anthony G. Polidoro** was named purchasing agent; **Boyette Edwards** was named specialist—operations research projects, and **Kenneth L. Laut** was appointed supervisor of manufacturing at the varnish plant in Coshocton, Ohio.

ARCHER-DANIELS-MIDLAND

Lytton Taylor has been appointed a technical sales service representative for the Atlanta, Ga. sales office.

Mr. Taylor started his business career in 1948 as a member of the company's technical sales service staff. Since then he has headquartered at the Minneapolis research laboratory where he has been active in the development of lacquer and vinyl plasticizers. A chemical engineer, he was graduated from the U. of Minnesota.

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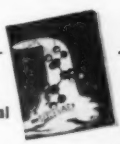

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abstracts

Component Effects on Polymer-Solvent Systems

By R. J. Kern, Research and Engineering Division, Monsanto Chemical Co., Dayton 7, Ohio. Presented at Div. of Paint, Plastics, and Printing Ink Chemistry, ACS Meeting, Sept. 11-16, 1955.

The generality of phase separation in solutions containing more than one polymer species has been recognized by experimental and thermodynamic treatments.

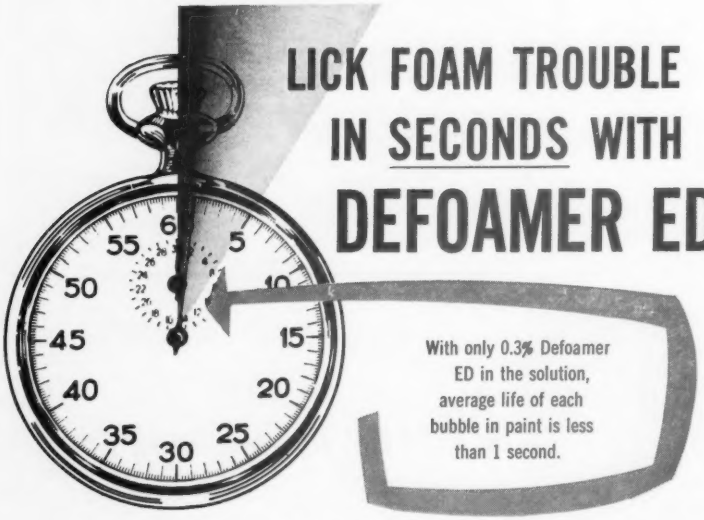
In this work new experimental data are presented in which the solvent and the chemical nature of the polymers are variables. The minimum amount of solvent necessary to achieve homogeneity was determined for 14 solvents using equal volume fractions of polystyrene and polymethyl-methacrylate. Analogous values were obtained using several pairs of substituted polystyrenes in a given solvent. A ternary phase diagram for the system polystyrene/poly-*p*-chlorostyrene/benzene in regions more dilute than 80 volume % solvent was constructed.

Curing Epoxide Resins By Amine Salts

By A. Bondi and H. L. Parry, Shell Development Co., Emeryville, Calif. Presented at Div. of Paint, Plastics, and Printing Ink Chemistry, ACS Meeting, Sept. 11-16, 1955.

In order to elucidate the mechanisms of Epon resin curing with amine salts, the dissociation equilibria of the triacetate of 2,4,6-tri(dimethylaminomethyl)phenol in nonaqueous media have been investigated. In the temperature range 20° to 80°C. it has been found that: ionic dissociation in solution is negligible (approximately 0.01 to 0.1%) and changes little, if any, with temperature; and molecular dissociation into free amine and free acid, either in the melt or in solution, is of the order of 20 to 25% at 80°C.

From the rate of cure of Epon resins observed with this salt, one would



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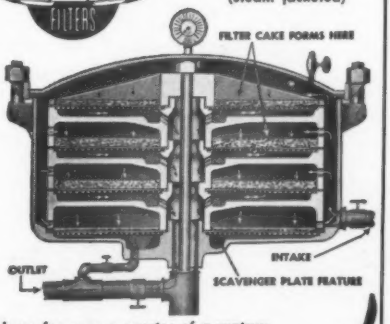

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assume that the salt is dissociated to more than 70% at 80°C. This discrepancy is reconciled by the suggestion that the first and rate determining step in the reaction is the removal of the fatty acid from the catalyst by esterification with some of the epoxide. Several previously unexplained observations are also explained by such a mechanism.

Compatibilities of Coumarone-Indene Resins

By A. C. Zettlemoyer and J. Vanderryn, Lehigh University, Bethlehem, Pa. Presented at Div. of Paint, Plastics, and Printing Ink Chemistry, ACS Meeting, Sept. 11-16, 1955.

The solubility relationships (precipitation temperatures) of a polyindene type resin were determined in mineral oil and in mineral oil-resin systems and in various organic solvents. The results are presented as two- and three-component phase diagrams. The average value of the solubility para-meter for polyindene is 9.2 as determined from solubility in selected organic solvents. The results indicate that:

1. The precipitation temperature of an unfractionated polymer is largely controlled by its highest molecular weight fraction.

2. Resin III, a modified methyl styrene resin, although it is completely miscible in the systems studied, does not act like a true solvent because it does not appreciably change the critical resin composition in the system.

3. Low polymers with almost identical solubility parameters may exhibit different quantitative solubilities in mineral oil and mineral oil-resin systems.

4. The critical composition for polyindene occurs at polymer concentrations much lower than predicted by theory.

5. The greatest deviation from the predicted critical polymer composition was exhibited by systmes having the highest critical solution temperature.

The thermodynamic parameters for solutions of polyindene in amyl and heptyl alcohol were calculated from precipitation data of its fractions. The values of the parameters are about one half of the values for a high molecular weight polystyrene-octyl alcohol system. This difference cannot be explained on the basis of existing theory.

Plasticizer Problems in Vinyl Resin Studies

By L. H. Wartman and W. J. Frissell, Development Laboratories, Bakelite Co., Division of Union Carbide and Carbon Corp., Bound Brook, N. J. Presented at Div. of Paint, Plastics, and Printing Ink Chemistry, ACS Meeting, Sept. 11-16, 1955.

As a result of investigations along several approaches, better concepts of the mechanism of plastization and the migration of plasticizer have been developed in the past few years. While much remains to be done, the framework of a basis for a more systematic approach to an understanding of plasticization and the design of new plasticizers has been developed. These developments are reviewed.

The failure of plasticized polyvinyl chloride in service is sometimes due to loss of plasticizer. In some cases light and oxygen cause chemical changes which affect the compatibility of the plasticizer and cause exudation. This type of failure occurs much less frequently than failure due to physical loss of the plasticizer by volatilization, rub off, or extraction. The mechanisms involved in these types of plasticizer loss are discussed.

High Gloss, Black Cellulose Finishes

By A. Weihe: Farbe und Lack, vol. 60, No. 9, pp. 398-402 (September 1954).

The author discusses technical problems encountered with carbon black dispersions in black cellulose finishes and gives details of new processing treatments for carbon black to provide better dispersion.

When carbon black grades were used in the early days of the nitrocellulose finishes, unexpected difficulties were encountered although these grades

had previously given satisfactory results with the drying oil finishes. It was found that with the normal processing machines of the lacquer industry such as ball mills, cone mills and roll stands the carbon black pigment could not be dispersed to a sufficient extent in the nitrocellulose lacquers so that high gloss coatings were obtained.

It was found also that the difficulties of the dispersion increased with the color depth of the carbon black. The explanation for this is briefly as follows. The carbon black dispersions achieved adversely, subsequently undergo again an agglomeration of the individual dispersed particles on account of the high surface activity of the carbon-black particles. Friction rolling was then tried to achieve a better dispersion — friction rolling being conducted with a pair of rolls running at a different circumferential speed. Although the carbon black was colloidally dispersed with this after intensive friction roll milling, agglomerations occurred again in the lacquer solutions and the finish effect did not come up to expectations. Real progress was only achieved when dispersers were added to the mixture. Numerous compounds have been tested and tried as dispersers—certain non-hardenable resins, copper salts of oleic acid and acid phthalic acid ester, aromatic diamines. Up to now it has not been possible to find a relation between constitution and dispersing action.

Another line of approach was to render the carbon black more suitable for lacquer formulation by means of chemical and physical methods, i.e. to reduce its surface tension forces. This can be achieved, for example, by oxidation with energetically acting liquids or dissolved chemicals. In this way, carbon blacks are obtained which contain up to 8% oxygen, apparently in the form of carboxyl groups. It was found also that heating of the carbon black with water under pressure with the addition of chemicals, strongly reduced the surface tension forces without loss of material, particularly if the aqueous carbon black dispersions which were obtained, were subjected to atomized drying. The viscosity of about a 10% milling of such a carbon black in oil is at least a decimal lower as compared with the untreated carbon black. A noteworthy fact also is the action of gas-developing reactions on the carbon black suspended in water, for example, the decomposition of ammonium nitrite or hydrazine salts with the freeing of nitrogen.

With the employment of high grade carbon blacks treated in this manner for the production of roll milling bodies, the solutions are of a lower viscosity in the normal solvent medium mixtures and also do not thicken up with pro-

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longed standing. Examination of the treated carbon black under the electron microscope show that the carbon black particles have a surprisingly uniform size of about 20 milli-microns diameter and there is no longer any tendency to agglomeration shown by the individual particles, as can be seen with the untreated carbon black. The diameter of the carbon black particles thus lies a decimal lower than the wave length of ultra-violet light.

Effect of Electrolyte on Moisture-Swell of Finish Films

By K. Meier and G. Schulz: Farbe und Lack, vol. 61, No. 5, pp. 220-225 (May 1955).

The electrolyte content of normal commercial pigments was ascertained with the aid of conductivity measurements. The amount of the electrolyte corresponds with the majority of the pigments to 0.2. 10^{-3} up to 0.8. 10^{-3} n. KC1, if 2 grms. of the pigment are shaken with 100 cc. of water. This corresponds to a content of 0.07 up to 0.3 grms./100 grms. of pigment, calculated as potassium chloride. Values below 0.2. 10^{-3} N. KC1 were shown by red lead, and titanium dioxide. Substratum holding pigments exceeded the value 0.8. 10^{-3} N. KC1 by considerable amounts (Gypsum 20.3. 10^{-3}).

The electrolyte can be absorbed either at the surface of the pigment particles or occluded in agglomerations.

The uninfluenced moisture-swell of the finish film is strongly influenced by the electrolyte content present in the film or in the fluid phase. If this electrolyte content is present in the film phase, then the moisture-swell velocity and maximum is increased. If, on the other hand, the electrolyte is present in the fluid phase, then the moisture-swell absorption and maximum are lowered.

These processes are governed by the vapor pressure differences in the film and fluid phases.

The swell-absorption lowering which some pigments are capable of inducing, with a given pigment concentration compared with the bonding agent for a zero electrolyte content, is designated as the swell-absorption resistance of the pigment (polyvinyl acetate + 25% TiO_2: 40%).

In general, by further freeing the pigment from the electrolyte content, the swell-absorption is considerably reduced (lead cyanamide). Pigments whose surfaces are in the position, of reacting with water, if only to a very slight extent, can only be freed up to a certain electrolyte content and in addition, a slight increase of the swell value can occur (zinc white, lead white, blanc fixe).

Gelation Phenomena in Alkyd Resin Solution

By E. G. Bobalek, R. I. Savage, and M. C. Schroeder, Case Institute of Technology, Cleveland, Ohio. Presented at Div. of Paint, Plastics, and Printing Ink Chemistry, ACS Meeting. 11-16, 1955.

In formulating alkyd resins for organic coatings, it is well known that the drying rates and film forming characteristics of a paint vehicle are determined in an important way by the procedure used in manufacturing the resin. Since it is difficult to attain reproducible reaction cycles from batch to batch, some method of predicting the film forming characteristics of the resin from a particular batch is needed.

Intrinsic viscosity and light scattering measurements were made on solutions of two series of filtered resins. The first series of resins was prepared by adding phthalic anhydride to the product of alcoholysis of linseed oil with glycerol. The second series was prepared in similar manner, using soya oil and pentaerythritol. Linear relationships were found between the intrinsic viscosity and the original viscosity of the undiluted alkyd solutions, the acid value of the alkyd resin, and the stroke-cure time of the alkyd resins. The latter two plots show something of the relative progress of the resin cook in the direction of gelation of the melt. An empirical correlation between light scattering and viscosity data was observed.

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PATENTS

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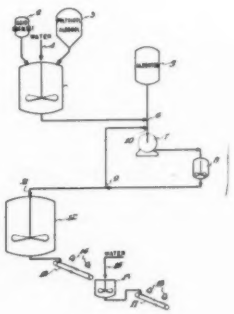
Aqueous Condensation Process For Preparation of Polyvinyl Acetals

U. S. Patent 2,720,501. Robert Terry Van Ness, Wilmington, Del., assignor to E. I. du Pont de Nemours and Company, Wilmington, Del., a corporation of Delaware.



U. S. Patent
2,720,501

The process comprising (1) preparing a mixture of an aqueous polyvinyl alcohol solution, a strong acid catalyst, and an aliphatic aldehyde having 2 to 6 carbon atoms, said aldehyde being present in an amount which is 5% to 40% in excess over the theoretical amount which will condense with the desired number of hydroxyl groups in said polyvinyl alcohol, (2) pumping the resultant mixture at 50°C. to 95°C. in a recirculating loop from which a continuous sidestream is drawn off, the flow rate of the sidestream being not more than about one-tenth of the flow rate in the recirculating loop and the linear velocity of the fluid in the recirculating loop being not less than about 5 feet per second, (3) collecting the material flowing from the sidestream and maintaining it at a temperature of about 60°C. to 100°C. until the desired degree of acetalization is essentially completed, (4) raising the pH of the resulting polyvinyl acetal resin slurry to some value from about 5 to about 7, (5) removing excess aldehyde, (6) stabilizing the resulting polyvinyl acetal resin by raising the pH to about 8 or more, and (7) recovering a polyvinyl acetal resin.

Rosin Condensates And Their Preparation

U. S. Patent 2,720,514. Alfred L. Rummelsburg, Chadds Ford, Pa., assignor to Hercules Powder Company, Wilmington, Del., a corporation of Delaware.

The process of producing a resinous condensation product which comprises subjecting a material containing a compound selected from the group consisting of rosin acids, esters of rosin acids, alcohols produced by the reduction of the carboxyl group of a rosin acid and esters of said alcohols to treatment with a compound of the group consisting of aldehydes and aldehyde polymers in the presence of an acidic siliceous clay catalyst at a temperature at about 60° to 300° C.

Preparation of Siloxanes Containing Carboxy Groups

U. S. Patent 2,721,856. Leo H. Sommer, State College, Pa., assignor to Dow Corning Corp., Midland, Mich., a corporation of Michigan.

A method of preparing copolymeric siloxanes which comprises cohydrolyzing a compound of the formula $XOC(CH_2)_nSi(CH_3)_2X$, where X is selected from the group consisting of chlorine and alkoxy radicals and n is an integer from 2 to 5 inclusive, with a silane of the formula R_mSiX_{4-m}, where R is a monovalent hydrocarbon radical free of C≡C linkages, and X is selected from the group consisting of chlorine and alkoxy radicals and m has a value from 0 to 3 inclusive, at a temperature below 50°C.

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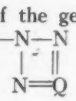
Fluorescent Whitening Agents

U. S. Patent 2,720,528. Herbert August Lubs, Westmoreland, and Mario Francesco Sartori, Monroe Park, Del., assignors to E. I. du Pont de Nemours & Company, Wilmington, Del., a corporation of Delaware.

A compound of the general formula



wherein R is the 2—C radical of a benzothiazole selected from the group consisting of benzothiazole itself, its 6-methyl, 6-methoxy, 6-ethyl and 6-ethoxy derivatives, and the monosulfo and sulfamyl derivatives of any of these, while Q represents the 1,2-radical of a naphthalene compound of the group consisting of naphthalene, its monosulfo, disulfo, monocarboxy, dicarboxy and monosulfamyl derivatives.

Polyvinyl Acetal Modified Silicone-Alkyd Resins

U. S. Patent 2,721,854. Charles F. Kohl, Midland, Mich., assignor to Dow Corning Corporation, Midland, Mich., a corporation of Michigan.

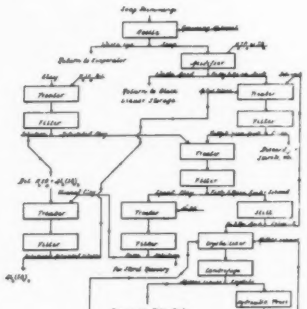
1. A composition of matter consisting essentially of (*a*) 40 to 99 per cent by weight of the reaction product of (1) 5 to 60 per cent by weight of an organosilicon compound of the formula

$$R_nSiX_mO_{\frac{4-m-n}{2}}$$

where R is selected from the group consisting of monovalent hydrocarbon radicals and halogenated monovalent hydrocarbon radicals ,X is selected from the group consisting of halogen atoms, alkoxy radicals and the hydroxy radical, and n has an average value of from 1 to 2 inclusive, m has an average value of from .05 to 3 inclusive, $m+n$ being not greater than 4; (2) 10 to 30 per cent by weight of polyhydroxy alcohol selected from the group consisting of trihydroxy alcohols, tetrahydroxy alcohols and up to 50 per cent by weight based on the total weight of the alcohol of dihydroxy alcohols; and (3) 30 to 70 per cent by weight of a compound selected from the group consisting of dicarboxylic acids, dicarboxylic acid anhydrides, and lower alkyl esters of dicarboxylic acids; and (*b*) 1 to 60 per cent by weight of polyvinyl acetal resins having incorporated therewith up to 50 per cent by weight based on the weight of the polyvinyl acetal resin of a heat hardenable phenol-aldehyde resin.

Method of Refining Tall Oil

U. S. Patent 2,720,515. Alfred M. Thomsen, San Francisco, Calif.



U. S. Patent 2, 720,515

The method of refining tall oil which comprises; remelting the soap skimmings obtained in black liquor recovery; adding a graining agent and settling out the waste lye; remelting the soap thus obtained and acidifying the same with a mineral acid selected from the group consisting of sulphuric and sulphurous acid; separating the dark colored aqueous product; diluting the mixed fatty and rosin acids thus obtained with a volatile solvent and commingling same with an activated silica produced at a later step in the process; separating said silica; commingling the resultant liquid product with an activated clay produced at a later step in the process; preparing said activated clay by commingling diluted sulphuric acid and clay until approximately one-third of the alumina resident in said clay has been converted to

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aluminum sulphate; separating and reserving the acid menstruum thus produced from the activated clay; drying said clay and commingling it with the mixed fatty and rosin acids as previously prescribed; separating said activated clay as a spent clay from the now substantially decolorized mixed fatty and rosin acids; commingling said rent clay with the acid menstruum previously reserved for this purpose until substantially all the acid and alumina resident in said admixture have reacted to form a solution of aluminum sulphate; separating said solution of aluminum sulphate thus obtaining as an insoluble residue the activated silica previously employed; removing solvent from decolorized mixed fatty and rosin acids and crystallizing a part of the rosin acids resident therein; separating said crystallized rosin acids from the liquid remainder consisting principally of fatty acids.

Paint Removing Process and Composition

U. S. Patent 2,721,848. Emil A. Vitalis, Springdale, Conn., assignor to American Cyanamid Company, New York, N. Y., a corporation of Maine.

A method of softening dried paint which comprises applying thereto a 2-50% solution in a liquid volatile organic solvent of an ethylene oxide condensation product of an aliphatic guanidinium N-aliphatic carbamate in which the aliphatic radicals contain 4 to 18 carbon atoms, said condensation product containing about 1-25 mols of combined ethylene oxide for each mol of amine combined in said carbamate.

Asphalt Compositions

U. S. Patent 2,720,466. Mathew L. Kalinowski, Chicago, Ill., and Frederick H. MacLaren, Munster, Ind., assignors to Standard Oil Company, Chicago, Ill., a corporation of Indiana.

An asphalt composition comprising a major proportion of a wax-containing asphalt and from 0.1% to about 10% of a condensation product of an aromatic compound selected from the class consisting of an aromatic hydrocarbon and a phenol and a chlorinated paraffin wax, said condensation being carried out in the presence of a Friedel-Crafts catalyst.

Free-Flowing, Nondusting Titania

U. S. Patent 2,721,787. Ames B. Hettrick, Plainfield, N. J., assignor to American Cyanamid Company, New York, N. Y., a corporation of Maine.

Free-flowing, non-dusting microspheroidal aggregates composed of calcined titanium dioxide "ultimate" particles about 0.2 to about 0.3 microns in size and possessing a specific surface area within the range of from about 4.5 to about 9 square meters per gram, as determined by nitrogen gas adsorption, together with about from 0.1 to about 3% of alkali metal silicate as a binder therefor, said aggregates having an average size of about 5 to about 150 microns, an apparent density of 0.5 to 1.1, an average rupture-resistance of at least 0.5 lb. per sq. in., and the property of ready mixing with dry powdered ceramic frit ingredients without balling, having a particle size distribution such that substantially all will pass through a screen having 100 meshes per sq. in. and not more than about 25-40% will pass through a screen having 325 meshes per sq. in. and being composed substantially completely of the anatase crystal modification of TiO_2.

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REGISTERED PATENT ATTORNEYS
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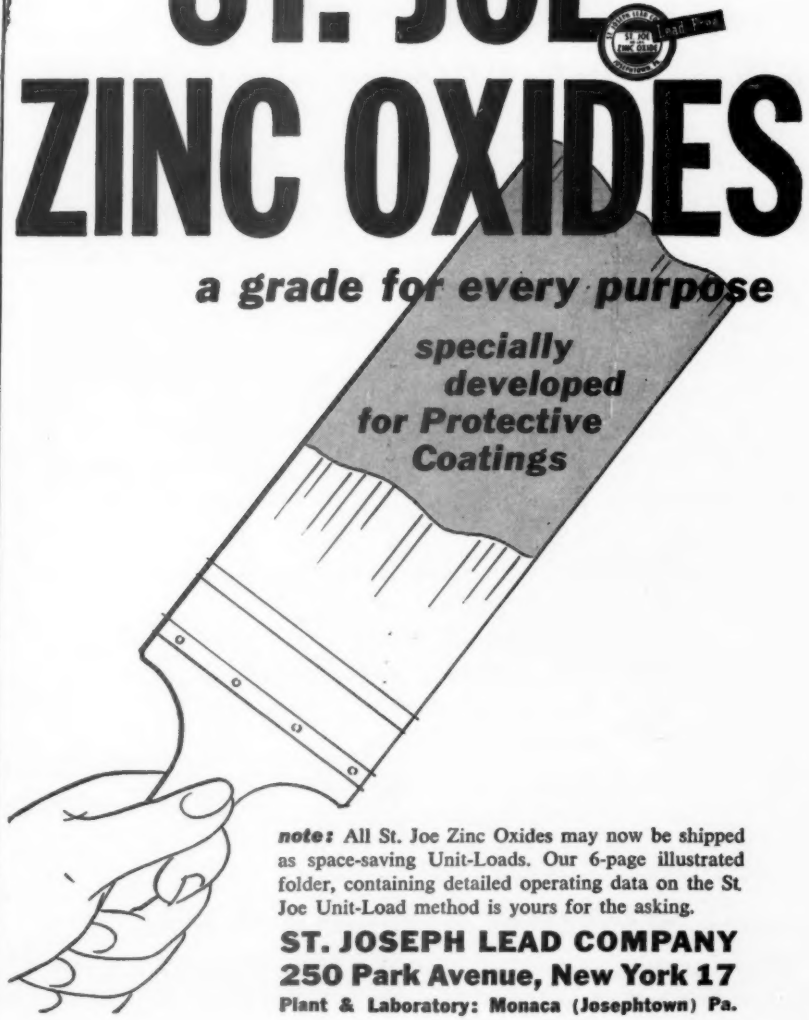

note: All St. Joe Zinc Oxides may now be shipped as space-saving Unit-Loads. Our 6-page illustrated folder, containing detailed operating data on the St Joe Unit-Load method is yours for the asking.

ST. JOSEPH LEAD COMPANY
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Plant & Laboratory: Monaca (Josephtown) Pa.

INDUSTRY TREADS

(*From page 31*)

Such products have no longer limited the time of painting to any particular season. Interior painting can be done during any season and this is true to some extent for exterior work. Again, this is due to products which have no problem of application, drying or odor.

In this connection, we must not overlook the growing importance of a "color-conscious" home owner who must paint in order that thecolor on his walls will be in harmony with the new furniture, new rug or new drapes his wife selects. Color has certainly been a dynamic factor in creating consumer demands for more paint.

More Synthetics

During the past 10 years synthetic materials have been used in increasing amounts in the manufacture of paint products.

With the trend toward the use of more synthetic material, consensus is that natural materials, particularly vegetable drying oils, are being used in lesser amounts. This general conclusion was brought out in a recent study entitled, "Market Potential for Fats and Oils In Drying-Oil Uses" by the U. S. Department of Agriculture. This report strongly recommends that present research be directed to the various phases of drying oil technology as a step for recapturing some of market lost to synthetic materials. The research calls for a thorough investigation of basic chemistry of drying oils including such studies as mechanism of drying, factors affecting color retention, basic chemical structure, increasing the speed of dry, and chemical modification.

However, in view of the outlook for increased consumption of all paint products during the years ahead, it is safe to assume that vegetable oils will have their place in the overall raw material picture.

Another obvious factor responsible for the curtailment of drying oil usage over the past few years has been the shift to water-thinned paints. Consumption of emulsion paints will reach 50 million gallons this year and it has been estimated that emulsion paint now account for 27 percent of interior paint sales.

There is no question that water emulsion systems have gained a foothold in the trade sales field and there is convincing evidence that emulsion systems will find their way into industrial finishing, particularly finishes for metal.

In the past water-soluble phenolics, alkyd water emulsion, chlorinated rubber emulsions have been investigated for such applications. More recently an acrylic emulsion system for automobile primers has been developed.

The obvious advantage of such systems is to reduce fire-hazards. At the present time it is difficult to ascertain how far in the industrial field these products will go, but this development surely points up the fact that water-thinned products are creating keen interest in all coating applications.

Atomic Energy and Automation

There are two developments which are receiving universal attention today—namely, industrial use of atomic energy and automation.

The recent "Atoms for Peace" conference held in Geneva during the past summer demonstrated the innumerable uses that radiation energy and radioisotopes can be put to in industry and medicine.

In the coatings industry the immediate possibilities foreseen for this important research tool include: determining homogenuity of mixing and grinding, determining solubility properties of solvents, determining the degree of pigment wetting and sedimentation, detecting pin holes and other film failures, measuring thickness of films, measuring the wearing properties of a coating or wax, tracing the movement of paints or waxes into base materials, studying corrosion, determining cleanliness of surface to which paint is to be applied, investigate permanency of plasticizers, evaluating rust preventives, and investigating chemical reactions, Radiation energy, on the other hand.

To **WOOD** *or* **METAL** *lacquers*

Zinflex

adds these important qualities

WOOD

- lighter, clearer, deeper finish
- better adhesion, elasticity, mar resistance
- high oil and naphtha resistance
- high solids content at working body
- no checking or "alligatoring"

METAL

- greater adhesion to brass aluminum, tin plate and *steel*
- better build
- improved flexibility
- greater hardness
- PLUS all the benefits Zinflex gives to wood lacquers

Zinflex the *modified* shellac lacquer additive, makes your fine lacquers better because—

1. It's modified for greater compatibility with hydrocarbon solvents
2. You can use *more* of it in your lacquer formulations.

Write today for technical data, suggested formulations, and a generous test sample. Zinflex is a product of William Zinsser & Co., producers of only the finest shellacs since 1849.

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can be used to initiate polymerization and control cross-linking.

As you can see the possibilities of radioisotopes and radiation energy in the paint industry are many. It is realized that cost for undertaking a study to determine the possibilities of these atomic tools in the paint industry is prohibitive for most paint firms. Perhaps a joint undertaking of both the National Paint, Varnish and Lacquer Association and Federation of Paint and Varnish Production Clubs could be initiated and the findings be disseminated to members of both organizations.

Like most industries, the paint industry is faced with the problem of producing products at a faster rate and, in many instances, this must be done without expanding present manufacturing facilities. Can automation help? Paint manufacturing is primarily a batch operation and automatic techniques and instrumentation have been successfully applied to the various phases of paint processing. These include automatic handling and weighing of raw materials before mixing, blending of solvents and vehicles by auto matic control system, and instrumentation in vehicle and varnish manufacture.

It is my understanding that your technical committee will evaluate automatic production methods. Their findings will interest every manufacturer, both large and small.

Attracting Technical Men

The problem of attracting more technically-trained men to our industry has taken on added significance in recent years in view of the fact that expansion of the paint industry has been primarily due to the fruits of chemical development. How we progress will immeasurably depend upon the continuous flow of technically-trained men to the industry. Specifically what can be done?

This is a very broad subject and there have been numerous suggestions and recommendations offered, but it is most important that the industry consider the salary factor. Offers from other segments of the chemical industry range from $350-575 per month to recent graduates depending on advance degrees—and with no practical experience whatsoever.

In this connection, it was brought out at the recent National Paint, Varnish and Lacquer Association convention in Washington that engineering and science graduates are receiving from industry starting salaries which will take the average college instructor at least five years on the campus to attain. Thus, as you might expect instructors are leaving their teaching posts and getting into industry. The implication of such a trend points up the problem—who will teach our future engineers, chemists, and physicists?

Mergers

Recent mergers has caused considerable concern and anxiety to many small businesses. In the chemical industry alone, mergers have been pretty widespread and some 60 mergers of primary significance have taken place within the last two years.

In the paint industry mergers have taken place to a certain degree, but by and large these were acquisitions.

The underlying reason for all mergers is to gain financial strength in order to embark on a vigorous program of developing and marketing new products, and to enter into diversified fields.

Some of us are wondering about the survival of the small paint manufacturer in an era where everything seems to be getting bigger and bigger. Many are of the opinion that the small manufacturer is on his way out since cost of operating will be beyond his means, especially in view of the introduction of automatic processing methods.

On the other hand, the small paint manufacturer has an uniqueness which has always been a distinctive feature in the paint industry in that his business is wrapped up in offering specialized products to his customers. In addition, he is able to render his customers a personalized service and is in a position to handle small and diversified orders, make quick deliveries, which the more larger firms find uneconomical to undertake. The small manufacturer has an

PICCOPALE — A new, low-cost, large production, high quality petroleum resin. Clear, clean, transparent, compatible, thermoplastic, readily soluble. Available solid, flaked or in solution.
PICCOLYTE—A pure hydrocarbon, pale, non-yellowing, thermoplastic, terpene resin that is low in cost, soluble in low cost naphthas, chemically inert, compatible with waxes, resins, paint and varnish oils.
PICCOUMARON — A series of thermoplastic, para-coumarone, indene resins, soluble in coal tar, turpentine, terpene and most chlorinated solvents. Inert to all except strong concentrated acids.
PICCOLASTIC — Piccolastic Resins are pale, unsaponifiable, stable in package, body and film, soluble in low-cost solvents, acid and alkali resistant. Permanently thermoplastic.
SOLVENTS and SOLVENT OILS—A complete series of aromatic petroleum naphthas, coal tar naphthas, heavy naphthas, coal tar heavy naphthas, solvent oils and heavy oils.
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important niche in the paint industry, and in view of future demands of coatings there will be enough business for all, regardless of size.

Impact of Polymer Research

Back in 1927, the introduction of alkyd resins, to the paint industry, was considered a truly significant achievement.

In recent years, we have witnessed the development of entirely new classes of synthetic resins with unique properties. With each passing development, it becomes increasingly evident that high polymer chemistry is playing a vital role in furthering the progress of the paint industry.

At the recent annual meeting of the Federation, Dr. Herman F. Mark in his Joseph J. Mattiello lecture, presented some new basic ideas in co-polymerization, which he termed as the graft and block type macromolecular structure. These new concepts and ideas will form the basis upon which the future paint research chemist will be able to design, on paper, the type of molecular structure that will embody specific properties for a particular coating application. Alkyds, epoxies, and more recently isocyanates and polyesters are but a few examples of graft copolymers. Thus, the benefits that the paint industry will gain from polymer research alone are indeed limitless.

On the basis of our economic picture plus the tremendous technical developments which have taken place and will continue to take place, there seems to be no question, whatsoever, that the paint industry faces unprecedented levels of progress and prosperity.

SYLOID® 162

Davison's NEW Alkyd-Urea Flatting Agent, for Synthetic Finishes, gives you

MORE FLATTING POWER AT LOWER COST

Laboratory tests and actual use tests have proven that **SYLOID 162:**

- **can be ground in one-quarter the time required by other varnish flatting agents.**
- **the flatting power is two to three times greater than existing materials.**
- **twice as much can be ground in a single mill charge.**
- **the high and low tones are not destroyed as with present varnish flatting agents.**
- **films are tough, durable and mar resistant.**
- **has an exceptionally high chemical purity.**
- **chemical properties are controlled to insure uniform performance.**
- **there is no "seeding".**

For further information on SYLOID 162—the alkyd-urea varnish flatting agent that gives you better performance at lower cost—write

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NEWS

Commercial Isosebacic Plant to Be Ready In 1957

The first commercial plant in the world for the production of isomers of sebacic acid, known as "U.S.I. Isosebacic" acid, will be built at Tuscola, Ill., it was announced by Dr. Robert E. Hulse, vice president and general manager of the U. S. Industrial Chemicals Co., Division of National Distillers Products Corp., New York City.

Tuscola was chosen as the location for the new plant because of the ready availability of raw materials there—hydrocarbons, sulfuric acid, etc.

Initial production capacity of the plant will be 10 million pounds per year and completion of the plant is scheduled for early in 1957.

This new product is the result of more than three years of research which began under the auspices of a National Distillers' fellowship at the University of Cincinnati and progressed through the company's research laboratory. For the last two years, "U.S.I. Isosebacic" acid has been in pilot plant production, first at U.S.I.'s former Fairfield plant and more recently in new pilot plant facilities at the Cincinnati Research Laboratory.

The product is said to show coniderable promise as a raw materials for vinyl resin plasticizers with excellent low-volatility, non-migration, and low-temperature characteristics.

Other promising applications include: the production of polyamide (nylon type) molding and extrusion plastics and adhesives; alkyd resin manufacture, to impart flexibility and water resistance to the surface coating film; the synthesis of ester lubricants of the type used in jet propelled aircraft; the production of polyester resins used in the manufacture of glass reinforced plastics; the synthesis of polyurethane resins for foamed plastics, synthetic rubber and protective coatings.

CALENDAR OF EVENTS

Dec. 5-7. Chemical Specialties Manufacturers' Assoc. Annual Meeting, Hotel Roosevelt, New York, N. Y.

Jan. 23-26, 1956. 7th Plant Maintenance & Engineering Show & Conference, Convention Hall, Philadelphia, Pa.

Jan. 25-27, 1956. Assn. of Amer. Soap & Glycerine Producers, 29th Annual Meeting, Waldorf-Astoria Hotel, New York City.

Feb. 29-Mar. 2, 1956. 20th Annual Convention Southern Paint and Varnish Production Club, Atlanta Biltmore Hotel, Atlanta, Ga.

Production Club Meetings

Baltimore, 2nd Friday, Park Plaza Hotel.

Chicago, 1st Monday, Furniture Mart.

C.D.I.C., 2nd Monday.
Cincinnati — Oct., Dec., Mar., May, Hotel Alms.
Dayton — Nov., Feb., April, Suttmillers.
Indianapolis — Sept., Claypoll Hotel.
Columbus — Jan., June, Fort Hayes Hotel.

Cleveland, 3rd Friday, Harvey Restaurant.

Dallas, 2nd Thursday, No Fixed Place.

Detroit, 4th Tuesday, Rackham Building.

Golden Gate, 3rd Monday, El Jardin Restaurant, San Francisco.

Houston, 2nd Tuesday, College Inn.

Kansas City, 2nd Thursday, Pickwick Hotel.

Los Angeles, 2nd Wednesday, Scully's Cafe.

Louisville, 3rd Wednesday, Seelbach Hotel.

Montreal, 1st Wednesday, Queen's Hotel.

New England, 3rd Thursday, University Club, Boston.

New York, 1st Thursday, Brass Rail, 100 Park Ave.

Northwestern, 1st Friday, St. Paul Town and Country Club.

Pacific Northwest, Annual Meetings Only.

Philadelphia, 3rd Wednesday, Engineer's Club.

Pittsburgh, 1st Monday, Fort Pitt Hotel.

Rocky Mountain, 2nd Wednesday.

St. Louis, 3rd Tuesday, Forest Park Hotel.

Southern, Annual Meetings Only.

Toronto, 3rd Monday, Diana Sweets, Ltd.

Western New York, 1st Monday 40-8 Club Buffalo.

Du Pont Plans Full-Scale "Hypalon" Plant By 1957

Plans for the construction of the first full-scale plant for the manufacture of "Hypalon" chemical rubber at Beaumont, Texas, have been announced by the Du Pont Co.

The new production facility, which will be located at the company's Beaumont Works, is scheduled for completion early in 1957.

"Hypalon" chlorosulfonated polyethylene is a synthetic rubber developed by Du Pont research. Limited quantities for trade evaluation and market development purposes have been supplied by an interim plant at Belle, W. Va.

The outstanding characteristics of "Hypalon" are its color stability and resistance to heat, chemicals, oxidizing agents, and weather, according to the company. It is particularly suitable, Du Pont says, for use in white side-wall tires, wire coverings, floor coverings, chemical tank linings, hose, belting, and protective coatings.

•

Week Off For Farnow Unit

The manufacturing facilities of Farnow, Inc., Long Island City, N. Y. will be closed from December 26, 1955 to January 2, 1956, according to an announcement from the company. The sales and order department will remain open and shipments will continue to be made.

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SIMPLIFIED LATEX AND EMULSION PAINT MANUFACTURING

A six year record of product uniformity and user satisfaction is part of the IMPerse story. Call on the Pigment Color Division of Imperial and see how IMPerse colors can help you. IMPerse colors, 20% aqueous organic pigment dispersions, mean virtual elimination of costly flocculation and color float. Learn how greater economy accompanies maximum uniformity and flexibility... deep tones and pastels are easily obtained from the same dispersion. IMPerse colors are available in a full range of decorator shades and in both anionic and non-ionic form. IMPerse colors are controlled by "micro" test for maximum dispersion and stability. IMPerse colors, a development of Imperial research, may well be an answer to some of your annoying latex and emulsion paint pigmentation problems.

For further information drop a line or call

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TECHNICAL Bulletins

ADIPIC ACID

Adipic acid is discussed in technical bulletin I-12 released by National Aniline Division, 40 Rector St., New York 6, N. Y.

This 8-page booklet covers the six basic reactions of the Carboxyl group and eleven basic reactions of the Alpha Methylene group. It also includes suggested uses for this chemical and a list of 45 literature references.

MD BLUE BOOK

Metals Disintegrating Co., Inc., Elizabeth B, N.J., has issued "Properties and Uses of Gold Bronze Powders" and "Properties and Uses of Aluminum Pigments (Pastes and Dry Flake Powders) and Aluminum Grain. These sheets are intended to replace those of the same title now in the MD Blue Book.

COLD WATER SOLUBLE GUMS

A folder, "Burtonite" Series 7 on cold water soluble gums from the seeds of cyamposis tetragonoloba and similar seed pod plants, edible, technical and methylated, has been issued by The Burtonite Co., Nutley 10, N.J.

MONOHYDRIC ALCOHOL

A technical booklet describing the properties and applications for "Abitol," a primary, monohydric alcohol, is available from Hercules Powder Co., Wilmington 99, Del.

The booklet includes a discussion of the use of "Abitol" in alkyd resins, as well as a discussion of the more important properties and other current general applications for this technical hydroabietyl alcohol.

Various sections deal with physical properties, chemical properties, "Abitol" in alkyd resin design, a table about effects of monofunctional alkyd modifiers on resins characteristics, "Abitol" in oil-modified alkyd resins, and "Abitol" in oil-free alkyd resins.

PLASTICS and RESINS

Newly revised, "1956 Condensed Reference File of Bakelite Plastics and Resins" presents the latest information about properties and uses of these materials supplied by Bakelite Co.

This 12-page booklet summarizes technical data about the wide range of special and general-purpose Bakelite phenolic, vinyl, styrene, polyethylene, fluorothene, polyester, silicone and epoxy plastics and resins, and Krene film and sheeting.

Specific properties of these plastics and resins are set forth along with information about their ability to be formed or processed in manufacturing operations. Typical products and uses of these materials are shown in 65 photographs.

Copies are available to business firms who send requests to Bakelite Co., 300 Madison Ave., New York 17, N. Y.

STORAGE TANK VENTING

Principles of venting flammable liquid storage and process tanks for effective operation, fire protection and low-cost maintenance are completely described in a new booklet, "Venting Fundamentals," profusely illustrated with photographs and diagramatic drawings explaining the text. Numbered references in the descriptive sections refer to the same numbers on the illustrations, and the application of each principle is explained clearly and concisely. Available from The Protectoseal Co., 1920 S. Western Ave., Chicago 8, Ill.

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Gallons	Pounds	
	100	R-11 NEVILLE RESIN
40	324	OKO Linseed Oil, M2.5
11.5	84	2-50-W HI-FLASH SOLVENT
53	340	Mineral Spirits
	2.7	6% Cobalt Naphthenate
114	850.7	

VEHICLE CONSTANTS

Solids	50%
Viscosity (Gardner)	B-C
Color (Gardner)	12-14
Acid Number (on solids)	3 Maximum
Set-to-touch	3-4 Hours
Dry	18 Hours

Method of Preparation: Melt and mix together R-11 Neville Resin and OKO Linseed Oil at 350°F. Reduce and add drier.

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P-60

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RESIN PILOT PLANTS

Data Sheet No. 2.10-3 describes five and fifteen gallon Patterson-Kelley Pilot Plants which utilize Brown recording temperature control instruments. Minneapolis-Honeywell Regulator Co., Industrial Div., Wayne and Windrim Avenues, Philadelphia 44, Pa.

KINEMATIC VISCOSITY BATH

Precision Scientific Co., 3737 W. Cortland St., Chicago 47, Ill., has published Bulletin 743 describing the redesigned Model "S" Kinematic Viscosity Bath. In addition to the applications of the bath, the bulletin discusses such new features as the improved temperature uniformity, higher control sensitivity, excellent interior visibility and sturdy construction.

THICKNESS MEASUREMENTS

Data Sheet No. 10.9-la describes thickness or weight control of pages, rubber, foil, coatings and other moving sheet materials. Applications, principles, features and instrumentation are given as well as sections on accuracy and personnel protection. Minneapolis-Honeywell Regulator Co., Industrial Div., Wayne and Windrim Avenues, Philadelphia 44, Pa.

POLYAMIDE RESINS

A 16-page pamphlet called "Versamids, A Demonstration in Resin Versatility," has been published by the Chemical Division of General Mills, Box 191, Kankakee, Ill. The booklet contains general information about "Versamids" plus specific data on each of the eight types currently marketed by the company. Successful end uses also are discussed. A table of specifications is included.

MATERIALS HANDLING

Junior Catalog 56G has been published by Nutting Truck and Caster Co., Faribault, Minn. In addition to the unusual application of balance style trucks to trailer-train operation, this 12-page, two-color catalog illustrates 49 different models of two wheel and platform trucks, 12 types of dollies and 15 styles of casters. Many application photos and complete specifications on each item provide concise product data.

SILICONE RESINS

A series of up-to-date data sheets on silicone resins has been issued by General Electric, Silicone Products Dept., Waterford, N.Y. The sheets list properties, formulations and applications.

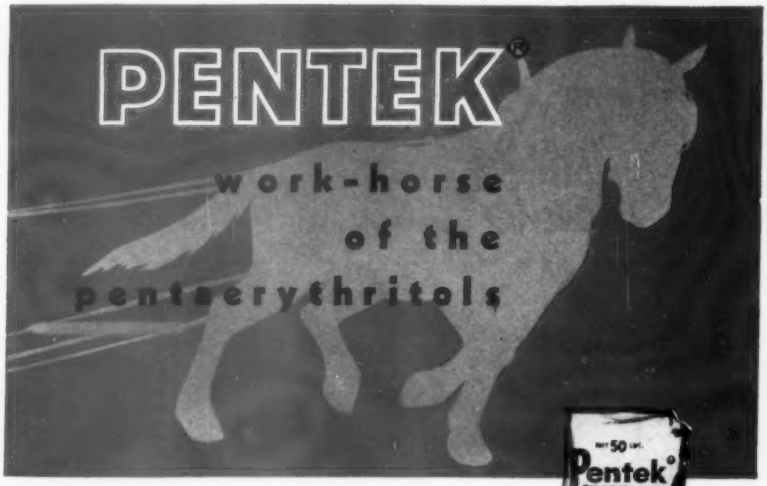
1955 PAINT SALES CLINIC

Archer-Daniels-Midland Co., 700 Investors Building, Minneapolis 2, Minn., has issued a 168-page book containing the proceedings of its 1955 paint sales clinic. The clinic was a four-day gathering held last June in Madden's Lodge on Gull Lake near Brainerd, Minn., with the single purpose of increasing the sale of paint.

PRODUCTS HANDBOOK

"Johns-Manville Products Handbook," is a 52-page publication featuring eleven lines of company products for industry—insulations and refractory products; transite asbestos-cement pipe; packings and gaskets; electrical products; celite diatomite filter aids and mineral fillers; celite diatomite catalyst carriers and metal raschig rings; synthetic silicates; friction materials; pipe protection materials; floorings; and, roofing and sidings.

The handbook contains product descriptions, essential engineering data, and also a great deal of valuable related information. Copies available from Johns-Manville, 22 E. 40 St., New York 16, N. Y.



Heyden Pentek—the best known name in pentaerythritol—is becoming the "work-horse" of the surface coatings industry. Leading manufacturers are using it to advantage in a steadily increasing variety of alkyds, drying oils, rosin esters, and in situ varnishes for more durable and better looking finishes.

You can prove for yourself that the dependable performance of Pentek and Heyden's long experience in meeting the exacting needs of resin producers can help you turn out a better product.

Heyden's complete line also includes these related pentaerythritols for applications requiring special properties:

MONOPENTEK® (Monopentaerythritol)
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For alkyds, polyesters, isocyanate resins, and synthetic drying oils.

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Benzaldehyde • Benzoic Acids • Benzyl Chloride • Beta-Oxynaphthoic Acid • Chlorotoluenes • Creosotes • Formaldehyde • Formic Acid • Guaiacols
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680 RED OXIDE	For making rust-inhibitive primers, also used in protective coatings for ammunition boxes. High Iron Oxide content, good suspension and easy grinding.
680 YELLOW OXIDE	Ideal for use in formulating Olive Drab coating, lusterless, semi-gloss and gloss. Also used in formulating Government camouflage paints.
680 MINERAL BLACK	To make Black Lusterless paint for use over sealed wood, as on wood barges above waterline. Also for use in other Government specification coatings.
680 MULTICEL	A. Diatomaceous Silica, generally used as a flatting agent and extender pigment. This grade will produce a non-secular flatness required in the lusterless enamels covered by Government specifications.

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PETROLEUM THINNER INDEX

A set of replacement pages for the "Petroleum Thinner Index," Circular 761, has been mailed to members of the National Paint, Varnish and Lacquer Association. Additional copies may be obtained on request to Association headquarters at 1500 Rhode Island Ave. N.W., Washington 5, D.C.

This initiates a program of semi-annual replacement pages which will keep the circular up to date until it is completely revised. The deadline for receipt of additions and corrections for the next set of replacement pages is January 1, 1956.

SYNTHETIC RESIN INDEX

A revision of the "Synthetic Resin Index," Circular 738, has been initiated by the Technical Division of the National Paint, Varnish and Lacquer Association, 1500 Rhode Island Ave. N.W., Washington 5, D.C.

All suppliers whose products previously appeared in the Circular are being notified, but other manufacturers of materials which should appear in this revised edition are requested to communicate with the Association's Technical Division. The revision will carry listings of latexes as well as the conventional synthetic resins. A deadline of January 1 for the receipt of information has been set up.

"KADY" DISPERSION MILLS

Kinetic Dispersion Corp., 95 Botsford Pl., Buffalo 16, N. Y. has published a new catalog of "Kady" dispersion mills. The mills are illustrated with photographs and working drawings. Complete descriptions, performance data, physical data and specifications are included. The range of tank capacities is from 1 gallon (laboratory model) to 210 gallons.

METHYL n-PROPYL KETONE

A new technical bulletin, F-8780, on methyl n-propyl ketone lists physical properties, specifications, shipping data, and applications. Solvent data on resin solubilities and the performance of methyl n-propyl ketone in nitrocellulose lacquers are also included. Available from Carbide and Carbon Chemicals Co., 30 E. 42 St., New York 17, N. Y.

CLASSIFIED ADVERTISEMENTS

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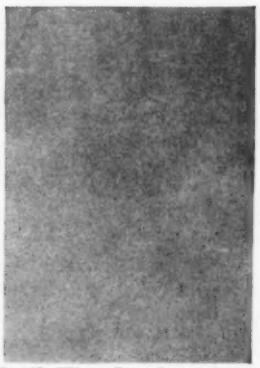
Award to E. C. Britton

Edgar C. Britton, director of the Edgar C. Britton Research Laboratory of the Dow Chemical Co., Midland, Mich., and past president of the American Chemical Society, has been chosen to receive the highest award in American industrial chemistry, the Perkin Medal of the American Section, Society of Chemical Industry, for 1956.

The announcement was made here by Clifford S. Rassweiler, chairman of the Jury of Award and vice-chairman of the Board of Directors of Johns-Manville Corp. Dr. Britton pioneered in the commercial development of silicone resins.

Panel 1—Copolymer "A" on asbestos cement panel after 50 wet rubs.

Panel 2—Copolymer "B" on asbestos cement panel after 50 wet rubs.



Panel 3—"Elvacet" on asbestos cement panel after 1,000 wet rubs.

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Panel 3 was painted with a Du Pont suggested formulation based on "Elvacet"* at the same temperature and under the same controlled conditions as Panel 1 and 2. This third panel showed no sign of failure, even after 1,000 wet rubs.

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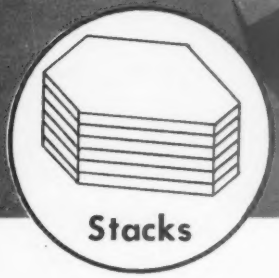
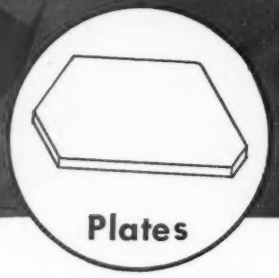
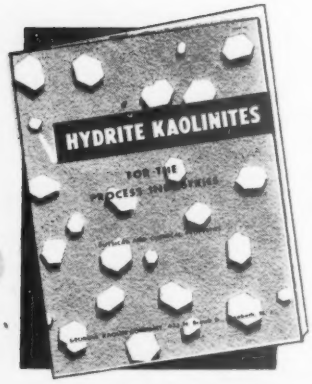


Stacks



Plates

These drawings illustrate the two characteristic shapes of typical HYDRITE Kaolinite particles. The proportions of each that occur in a particular grade have a pronounced effect on the properties of the paint formulation in which that grade is used.



In addition to the ratio of plates to stacks, the chemical, physical, and colloidal properties of the HYDRITE Kaolinites have an important bearing on their usefulness as extender pigments. Due to their basic nature, these grades impart desirable brushing, levelling, and suspension characteristics, and are extremely easy to disperse. Furthermore, their inert nature and freedom from soluble salts causes them to be completely non-reactive in all types of paint systems.

More detailed information on chemical, physical and colloidal properties, including specifications on each grade is available in our new bulletin TSBH-10, entitled "HYDRITE KAOLINITES FOR THE PROCESS INDUSTRIES." SEND FOR IT!

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